PROCEEDINGS

OF THE

TWENTY-SEVENTH GENERAL MEETING

OF THE

NATIONAL VETERINARY ASSOCIATION

HELD AT

THE GEORGE HOTEL,
HARROGATE,

ON

July 7th and 8th, 1909.

H. & W. Brown, Printers, 20 Fulham Road, London, S.W.

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National Veterinary Association.

GENERAL MEETING,

1909.

SECRETARY'S REPORT.

President.

George Bowman, Esq.

Life Vice-Presidents.

Principal McCall
Professor J. Wortley Axe
Mr. J. Malcolm
J. F. Simpson, J.P.
J. Mackinder
J. M. Parker
E. Faulkner
W. Hunting
W. Bower

Mr. A. W. Mason
W. H. Bloye
Matthew Hedley
Prin. J. R. U. Dewar
Sir J. M'Fadyean
Mr. F. W. Garnett, J.P.
Chas. Allen
R. C. Trigger, J.P.
W. Shipley

Vice-Presidents.

Mr. R. Roberts
J. A. Todd
S. Wharam

Mr. W. Burt, Jun.
J. McKinna
J. S. Lloyd

Council.

Mr. J. Abson
J. W. Coe
J. J. Bell
S. Locke
F. L. Gooch
W. A. Taylor

Mr. R. Hughes
W. Woods
J. Cooke
J. H. Carter
W. N. Dobbing
A. Porritt

Members of the Association who are also President or Secretary of an existing local Veterinary Society—

Presidents :

Mr. H. G. Bowes
Dr. O. Charnock Bradley
Mr. J. W. Coe
F. Hobday
J. Holland
P. J. Howard
J. McKinna
Trevor Spencer
E. L. Stroud

Secretaries :

Mr. W. Ascott
W. Awde
J. Clarkson
H. J. Dawes
G. H. Locke
J. Robertson
J. Alex. Todd
W. H. Wilkinson

Provisional Committee.

Chairman : Mr. H. G. Bowes

Mr. A. Lawson
J. Atcherley
W. Edmondson
G. Elphick
T. C. Fletcher
H. Hunter
M. Robinson
W. G. Schofield
F. W. Somers
A. McCarmick
A. Ellison
F. W. Pawlett
W. Crawford

Mr. G. Whitehead
F. W. S. Clough
E. H. Pratt
R. Cockburn
H. Sumner
S. E. Sampson
T. Hopkin
A. W. Mason
G. W. Carter
J. R. Hickes
F. Hallilay
J. A. Hodgman
T Pratt

Hon. Secretary : Mr. J. Clarkson.

Trustees.

Messrs. R. C. Trigger; J. F. Simpson, J.P.; F. W. Garnett

Auditors.

Messrs. S. Villar and J. Macqueen

Treasurer.

J. F. Simpson, Maidenhead

Secretary.

Wm. Hunting, 5 Halkin Place, Belgrave Square, London, S.W.

The Twenty-Sixth Annual Meeting was held at Brighton on August 11th and 12th, 1908, under the Presidency of R. Roberts, Esq., F.R.C.V.S.

The proceedings were published and issued to all the members.

A Council Meeting was held at Leeds on October 30th, 1908, at which the Provisional Committee for the year was elected.

A Council Meeting was held at Leeds on May 22nd, 1909, at which delegates were selected to represent the Association at the Health Congress at Leeds in July, and at the International Veterinary Congress at The Hague in September.

The Provisional Committee have made all arrangements for the Annual Meeting, 1909, at Harrogate, on July 7th and 8th, and have drawn up the following order of proceedings:

Dr. *Treasurer's Cash Account from September 11th, 1908 to June 17th, 1909.* Cr.

	£	s.	d.
To Cash received from the Executrix of the late Treasurer (F. W. Wragg, Esq.) being balance of Cash Account, 1907-08 ...	173	12	8
,, Subscriptions 1909, and Arrears ...	240	4	9
,, Dividend on £400 Consols 3 quarters to April 5th, 1909	7	2	6
	£420	19	11

	£	s.	d.	£	s.	d.
By Annual General Meeting at Brighton, August 11th and 12th, 1908,						
Hire of Pavilion Rooms and Lawns	21	15	6			
Expenses at Banquet	21	0	0			
Reporting Proceedings	30	7	4			
Secretary's personal Expenses ...	2	2	0	75	4	10
,, Printing Proceedings of Meeting, notices of Council, and Provisional Committee, Stationery a/c				74	7	8
,, Sundry General Expenses,						
Treasurer's payments for Local Printing, Books, Stationery, Stamps etc., ...	3	10	6			
Wreath for the late Treasurer's Funeral	2	2	0			
Subscription to the "Wragg Memorial"	5	5	0			
Expenses, Transfer of Trustees ...	1	15	1			
Cheque Book		10	0			
Cyclostyling Letters, and addressing same and posting		12	6	13	15	1
,, Delegates' Expenses 1908: Buxton Congress	4	4	0			
Cardiff Congress	4	4	0	8	8	0
,, Tickets, Two Delegates to Hague Congress	1	14	0			
,, Tickets for Two Delegates to Royal Sanitary Institute Congress at Leeds, 1909 ...	2	2	0	3	16	0
				175	11	7
,, Balance at Bank				245	8	4
				£420	19	11

I hereby certify that I have had produced to me, and I have examined the books, receipts, accounts and securities connected with the National Veterinary Association and find them correct, and I have prepared the Cash Account as above, and that the Balance in favour of the Association at this date is £245 8 4 in agreement with the Bank Book, and that the amount of £400 is invested in Consols in the names of the appointed Trustees.

George Wright, Accountant,
8 Thurlow Terrace, Haverstock Hill, London, N.W.

June 17th, 1909.

National Veterinary Association.

Meeting at the George Hotel, Harrogate,
On July 7th and 8th.

President, Mr. **GEORGE E. BOWMAN, M.R.C.V.S.**

ORDER OF PROCEEDINGS:

FIRST DAY (Wednesday, July 7th.)

10 a.m. **"Injuries to Flexor Tendons and Ligaments,"**
By Prof. Macqueen, F.R.C.V.S.
Discussion opened by Prof. Dewar, F.R.C.V.S.

1.30 p.m. Luncheon.

2.30 p.m. **"Our Horse Supply,"**
By Lt.-Col. A. F. Appleton, A.V.C.
Discussion opened by R. Brydon, M.R.C.V.S.

7 p.m. **Annual Banquet.**

SECOND DAY (Thursday July 8th)

10 a.m. **"Mallein and Tuberculin,"**
By Sidney Villar, F.R.C.V.S.
Discussion opened by J. Malcolm, F.R.C.V.S.

1.30 p.m. Luncheon.

2.30 p.m. **"Auto-Poisons,"**
By H. Sumner, M.R.C.V.S.
Discussion opened by Prof. N. Almond, F.R.C.V.S.
Reception by the President (G. E. Bowman, Esq.,) from 8 to 11 p.m.

THIRD DAY (Friday, July 9th.)

Excursion to Bolton Abbey, Barden, and Burnsall (Upper Wharfedale), on the invitation of the Yorkshire V.M.S., starting at 10.30 a.m.

TWENTY-SEVENTH GENERAL MEETING

Held at The George Hotel, Harrogate,

July 7th and 8th, 1909.

Mr. GEORGE BOWMAN, F.R..C.V.S., President, in the Chair.

Members present: Messrs. J. Abson, A. H. Archer, W. Awde, G. A. Banham, G. C. Barber, R. Barron, G. J. Bell, J. Bell, H. G. Bowes, O. Charnock Bradley, W. S. Carless, J. H. Carter, J. Cameron, J. Clarkson, J. W. Coe, T. D. Connochie, J. Cooke, W. Crawford, D. G. Davies, J. R. U. Dewar, T. A. Douglas, G. R. Dudgeon, G. Elphick, A. Ellison, T. C. Fletcher, J. Furniss, A. Gofton, F. L. Gooch, F. Hallilay, D. Hamilton, W. Hamilton, H. Hunter, W. Hunting, J. Hutton, J. J. Kelly, J. S. Lloyd, G. H. Locke, A. McCarmick, J. McGavin, J. McKinna, J. Malcolm, A. W. Mason, G. M. Mitchell, F. W. Pawlett, E. H. Pratt, T. Pratt, W. D. Rees. R. Roberts, T. A. Rudkin, F. G. Sampson, S. E. Sampson, W. Shipley, J. F. Simpson, S. H. Slocock, W. W. Smart, T. Spencer, A. Spreull, E. H. Stent, R. C. Trigger, S. Villar, S. Wharam, G. Whitehead, W. Woods, J. H. Wynne.

Visitors: Lt. Col. A. F. Appleton, Mrs. Awde, Mrs. G. A. Banham, A. Blake (Rangoon), W. H. Brown, Mrs. Cameron, Mrs. G. M. Coe, Mrs. Connochie, Mrs. Cowx, P. Deighton, A. H. Gentle, Mrs. F. L. Gooch, Miss L. Hunting, Mrs. J. S. Lloyd, Miss Hilda Lloyd, Miss Katie Lloyd, Miss M. B. McGavin, Mrs. Spreull, Mrs. Stent, Miss Trigger, Mrs. S. Villar, W. L. Williams (Ithaca, N.Y., U.S.A.)

First Day. Wednesday, July 7th.

On the motion of Mr. J. S. Lloyd, seconded by Mr. F. L. Gooch, the minutes of the previous meeting were taken as read and confirmed.

Mr. J. H. Carter: I beg to move the adoption of the report and balance sheet.

Mr. J. Cameron: I will second that. In connection with a motion for the adoption of the report I do not wish to make any lengthened speech, but I should like to say that I hope in future reports there will be some other small items chronicled. I am one of those who are not satisfied that we have exhausted our capacity for the good which can be obtained by and through our National Veterinary Association. I am not going to trouble you with any any suggestion, but I hope that those who like myself think the report could be improved will in the future send in suggestions to the office bearers, for instance, in connection with such subjects as the revival of practical demonstrations such as we have have had in previous years. It is all very well to hear about a thing, but seeing is believing, and we know that seeing has a better effect than hearing has sometimes. There are various other suggestions that might be adopted, but so long as our office bearers never hear a word of anything suggested by by anyone they take it for granted that silence gives consent. I think it is our duty to make our ideas known to them.

The resolution was carried.

The Report and Balance sheet were then adopted.

The President: We have now to fix the place of meeting for next year.

Mr. W. Shipley: I beg to propose that the meeting be held in London next year.

Mr. J. F. Simpson: I have much pleasure in seconding that motion.

The resolution was carried unanimously.

ELECTION OF OFFICERS.

The President: Our next business is the election of President for the coming year. At the Council meeting last night the name of Prof. Macqueen was unanimously adopted for recommendation to this meeting, and I have very much pleasure in proposing that he be elected as President for the next year, and I will ask you to signify your approval by acclamation.

The motion was carried by acclamation.

Prof. J. Macqueen: I have very great pleasure in thanking you for the distinguished honour you have conferred upon me, and I shall endeavour to discharge the duties of the office to the satisfaction of the members, and I hope with credit to myself. (Cheers).

The President: I will ask the Secretary to read the list of Vice-Presidents recommended for the next year.

Mr. W. Hunting: The names recommended are Mr. T. Salisbury Price, Mr. G. Bowman, Mr. Charles Sheather, Mr. S. Stockman, Mr. Sidney Villar, and Mr. F. L. Gooch.

Mr. Bowes: I have great pleasure in proposing that those six gentlemen be elected as Vice-Presidents.

Mr. R. Roberts seconded the motion, which was carried unanimously.

The President: I will ask the Secretary to read the suggestions of the Council for twelve members of Council.

Mr. Hunting: They are Prof. H. A. Woodruff, Mr. A. L. Butters, Mr. S. H. Slocock, Mr. F. G. Samson, Dr. James McI. McCall, Prof. G. H. Wooldridge, Mr. W. J. Mulvey, Mr. Henry Gray, Mr. J. B. Martin, Mr. Ainsworth Wilson, Mr. J. Willett, and Prof. F. Hobday.

Mr. S. Villar: I have much pleasure in proposing that those twelve gentlemen whose names Mr. Hunting has read out be elected as our Council for the ensuing year.

Mr. J. J. Bell seconded the motion, which was carried unanimously.

Mr. Hunting: It is suggested that the Trustees be re-elected. They are Messrs. Trigger, Simpson, and Garnett.

Mr. C. Roberts: I have very much pleasure in proposing that the Trustees of the Association, Messrs. R. C. Trigger, J. F. Simpson, and F. W. Garnett be re-elected as Trustees.

Mr. Smith seconded the motion, which was carried unanimously.

Mr. Hunting: As Auditors the Council last night made one little change. Instead of having two members of the Association they suggest that in future we have one professional Auditor and one of our own members, Mr. Sidney Villar.

Mr. F. L. Gooch: I propose that.

Mr. J. S. Lloyd: I will second it.

The motion was carried unanimously.

Prof. J. R. U. Dewar: I presume that is one Auditor, and the other Auditor has to be appointed by the Council.

Mr. Hunting: No, selected by the Treasurer.

Prof. Dewar: The Treasurer alone?

Mr. Hunting: Yes.

Prof. Dewar: Then the whole thing hangs on the Treasurer.

Mr. J. F. Simpson: No, selected by the Treasurer, the President, and the Secretary.

Prof. Dewar: That is better. I only wanted to understand the position.

Prof. J. Macqueen: I have great pleasure now in proposing that Mr. J. F. Simpson be re-appointed Treasurer of this Association, and I do so with special pleasure on this occasion because of what transpired at the meeting of Council last night, I should like to say that Mr. Simpson has discharged the duties of the office at a very unfavourable period with very great satisfaction, and I have therefore much pleasure in proposing that he be re-elected.

Mr. J. H. CARTER: I have great pleasure in seconding the proposition.

The motion was carried unanimously.

WELCOME TO HARROGATE.

The PRESIDENT: Ladies and Gentlemen, I have much pleasure in introducing to you Mr. Lofthouse, the Deputy Mayor of Harrogate, who has kindly come to welcome us to the town over which he presides. Harrogate is well known to you all as a health resort, a place surrounded by beautiful country, and I am sure after your visit here you will go away and recommend your friends to come. (Hear, hear.)

Mr. LOFTHOUSE: Mr. President, Ladies and Gentlemen, I have great pleasure in being here to welcome you to Harrogate, but I have first to express on behalf of the Mayor his regret at not being able to be present this morning to undertake the duties that I have now undertaken for him. He has some very important business to perform this morning, and has to go away to London this afternoon, so that it was quite impossible for him to be here. We are always very pleased to welcome a body of gentlemen representing one of the great professions to our beautiful town. We know that you are not only satisfied and pleased at being able to see what we have done to make this town what it is, but you have all derived the advantage from being able to see what has been done, and we know that it acts for the benefit of Harrogate, because you go away and tell everyone you meet what a beautiful town Harrogate is, and how much you enjoyed the visit. (Hear, hear.) We are pleased to welcome the representatives of a profession like yours because we know that your profession ranks at any rate as the third of the great professions in the country. If you place the church first, the medical profession second, yours certainly ranks the third—and I do not know whether you cannot be placed on an equality with the second profession, the medical, because the human animal owes as much to you in the modern developments that have taken place in your profession, for maintaining them or helping to maintain them in a state of health, as the profession I have placed as No. 2. I do not intend to detain you any longer this morning. I have to announce to you that Alderman Milner, the Chairman of the Wells and Baths, has invited you to the Baths and will be pleased to show you over them at a quarter to two tomorrow afternoon. The Chairman of the Kursaal Committee has also invited you and the ladies to attend the Symphony Concert in the Kursaal this afternoon, for which tickets and programmes will be sent to your Secretary, and we shall be pleased to see as many there as can possibly come. I have much pleasure in again welcoming you to Harrogate, and I hope you will enjoy your visit and that it will prove not only an advantage to you from an intellectual standpoint, but also from a social and pleasurable standpoint. (Cheers).

Mr. A. W. MASON : I am sure you will agree with me, Ladies and Gentlemen, that after the kind words of welcome which have come from Councillor Lofthouse we should pass a hearty vote of thanks to him for welcoming us to this beautiful town.

Carried with acclamation.

Councillor LOFTHOUSE : I am very much obliged to the President, and I will not detain you further this morning.

(Councillor Lofthouse then left the meeting).

Mr. J. F. SIMPSON : I have to thank you now for re-electing me as Treasurer, and of course I am only addressing the gentlemen, because although we are glad of the presence of the ladies they took no part in voting for my re-election. I thank you exceedingly for the honour you have done me, and I hope to be able to keep the finances in a satisfactory condition, and in that I am very much helped by the members paying me a short visit while I am at this table and thus saving themselves the cost of postage later on. (Laughter).

The PRESIDENT : The next business is the election of Secretary and I have very much pleasure in proposing a name which I know will be accepted by you all, and that is Mr. Hunting (Cheers). We all know what a very able Secretary Mr. Hunting is, and how attentive he is to business, and I am sure we shall be unable to replace him if once we lose him. Therefore I have very great pleasure in proposing him as Secretary.

Mr. J. J. BELL : As the one who originally nominated Mr. Hunting for the Secretaryship, I have very great pleasure in seconding the proposition.

The resolution was carried unanimously.

Mr. HUNTING : I simply desire to thank you for my re-election. I noted what the President said, that it was the sort of negative position and that the great skill I showed in doing nothing was the means of making the thing go. (Laughter).

Mr. R. C. TRIGGER : I should like to have the pleasure, if I may, of moving the next resolution, and that is that Mr. Roberts, who so ably fulfilled the office of President during the past year at Brighton be elected as a life Vice-President of this Association, as a slight recognition of the admirable manner in which he performed his duties. (Cheers). It requires no further words from me to assure that this resolution will receive your hearty support.

Mr. J. F. SIMPSON : As one who shared in the hospitality of Mr. Roberts at Brighton, and as one who observed his conduct in the Chair through the whole year during the time he occupied the Presidential Chair, I should like to have the pleasure of seconding the motion. The addition of his name to the list of Life Vice-Presidents will be doing honour to those who have gone before him. (Cheers).

The resolution was carried unanimously.

Mr. RICHARD ROBERTS : I thank you, gentlemen, for the honour you have done me in making me a life Vice-President of this Association. I assure you that I highly appreciate the honour, and shall feel it a distinguished honour to have my name on that list for the remainder of my days. I have already assured you that it was a year of very great pleasure to me during which I was President. I was delighted to occupy the position and it gave me much felicity all the year, and at its termination I feel very proud to have received this further honour you have just conferred upon me. (Cheers).

PRESIDENTIAL ADDRESS.

Ladies and Gentlemen,—I must first of all thank you for your your kindness in electing me President of this Association ; I appreciate the high honour conferred upon me. It was with some reluctance I accepted the position, knowing full well my limitations, but with your kind assistance and indulgence I shall do my utmost to bring this Conference to a successful issue. Although I have not regularly attended the meetings of the National Veterinary Association, I am conscious of the good they do our profession, both socially and scientifically, and I have always come away from such of the meetings I have attended very much enlightened, and felt I had spent the time most profitably.

It is about eight or ten years since the Association visited Yorkshire, and during that period Harrogate has become one of the most noted health resorts in the Kingdom, chiefly due to the enterprise of its Corporation, its beautiful surroundings, and its famous medicinal baths and waters. I have the greatest pleasure in welcoming you to this queen of watering places I often think what a great pity it is so many of our members do not join this Association ; I am sure they little know what they miss or they would most certainly do so. At our annual meetings we come in contact with many old friends we only see once a year ; we also make many new acquaintances ; we gain many new ideas, and talk matters over that are both interesting and beneficial to us all. I am afraid the reason so many do not join us is on account of the great period of depression though which we are passing. What with electric haulage, motor waggons, and motor cars, I fear I cannot congratulate the profession on its prosperity. In the city where I practise I can positively say we have some thousands of horses less than we had ten or twelve years ago, and many large firms are now buying motor waggons to do their dray work, and are still doing away with their horses. At the same time, if our source of income is steadily decreasing in that way, there are opportunities of practice in other directions which are opening out. The appointments in connection with Public Health work look very promising. The number of appointments in Public Health Service—which members of the profession are specially qualified to fill—are bound to increase very materially in the future, both in regard to the inspection of meat and the inspection of dairy cattle and milk.

The Right Hononrable John Burns' Milk and Dairy Bill, and the new Tuberculosis Order of 1909, will undoubtedly make a large amount of new, and I trust remunerative, work for the veterinary surgeon. If the Local Authorities carry out the conditions laid down in Mr. Burns' Bill, and in the Order of the Board of Agriculture, in a uniform manner throughout the country it will greatly reduce tuberculosis in dairy cattle, and at the same time will remove much of the danger from tuberculous milk.

I feel certain that the veterinary profession will loyally assist the Government and Local Authorities in trying to stamp out this terrible disease. I do not agree that veterinary surgeons should interfere with the duties of the Medical Officer of Health, but I contend that by virtue of his qualifications he has his place in Public Health work, and is able to assist the medical officer when live animals, meat, milk, cowsheds, etc. are to be inspected. As veterinary surgeons we feel confident we are trained and equipped to deal satisfactorily with any contagious disease in animals, if we are invested with power to do so, and I think we may congratulate ourselves on the position we hold as veterinary surgeons in Mr. Burns' Milk Bill.

Prof. Williams and a Committee are at present engaged in a scheme to bring before the Council of the Royal College of Surgeons the creation of a Diploma for Public Health work, which action I commend, because it would indicate a man's special fitness for such appointments.

The Bill has yet to become law, but we may anticipate that with few changes it will be ultimately ratified. The Order comes into force on January 1st, 1910; the Bill and the Order are complementary to one another—they both aim at producing a pure milk supply, and the Order goes a long way towards controlling bovine tuberculosis. There is a clause in the Bill suggesting the appointment of two classes of Veterinary Inspectors, one under the Board of Agriculture, the other under the Local Government Board. Any additional appointments will be welcome to us as veterinary surgeons, but I am afraid this arrangement may easily lead to overlapping of duties and conflict of opinion, with unnecessary expense.

The Tuberculosis Order is not a wide measure but it is a good commencement. It provides for compulsory notification of visible tubercular cases, and will ensure the removal and destruction of all wasters and of cows with diseased udders. I am of opinion that the removal of wasters from either sheds or field will have a beneficial effect and will assist very materially in stamping out tuberculosis. The Order will do an immense amount of good, it will disclose the existence of disease, educate the stock owner, and put an end to the most dangerous centres of infection. I notice there is no compulsory use of tuberculin, which I consider is perfectly right. (Hear, hear.)

Amongst other new appointments open for veterinary surgeons is that of Inspectors of the Hunters Improvement Society. To this end England and Wales have been divided into districts, and each one will have its own Veterinary Inspector to examine stallions and mares for registration in the stud book of the Society. They must be free from the following hereditary diseases—roaring, whistling, ringbone, unsound feet, navicular disease, bone spavin and cataract. I am of opinion that every stallion travelling in this country should be examined by a member of the Royal College of Veterinary Surgeons and have a certificate to testify that he is free from the above mentioned diseases before he is allowed to travel.

A Presidential Address is a very useful medium in which to express one's views in regard to matters affecting the profession as a whole, it allows one to say exactly what one thinks, so I hope the remarks I make will be indulgently received.

I will proceed to say a few words respecting our new Bill. There never has been an Act of Parliament promoted which has given rise to greater internal controversy and external irritation, in proportion to the interest affected, than has the new Veterinary Surgeons Bill. I have no fault to find with those provisions of the Bill which would place in the Exchequer of the Royal College of Veterinary Surgeons an additional income, sufficient for the requirements of so important a body, and I think every member ought cheerfully to pay his guinea a year for the furtherance of objects which are considered to affect his welfare, by the men in whom, by his vote, his confidence is reposed. It is well known to us all that the Royal College is in want of more money for various claims; the schools are not getting the number of students they used to do, there is consequently a falling off there in regard to fees; the examiners, in my opinion, are not above half sufficiently paid, and many of the Committee are afraid to do their duty on account of expense. I am extremely sorry there have been such differences of opinion in the profession, and I consider if the thing had been threshed out sufficiently in Council meetings instead of getting into the public press, it would have been far better for all connected with it.

Finally, gentlemen, I do not wish to tire you with a long Presidential Address, for I know many of you are far more conversant with the inner workings of the veterinary profession than I am, therefore I will not waste any more of your valuable time.

I commend to your notice the excellent papers we have to put before you, and trust we may have a good and full discussion, so that when the Conference is over we can feel we have all benefitted. I appeal for your hearty support and crave your indulgence for my own limitations. (Cheers.)

Prof. Dewar: As the President occupies the happy position that we are not able to criticise his address, and he has not the knowledge hanging over him that Professor Macqueen is coming behind him to criticise, he was at liberty as it were to rove over a wide subject, and he has reviewed the position of the profession and its prospects in the future very fully. We are much obliged to the President for the address he has given us, and it remains for us to give him a hearty vote of thanks for his excellent address this morning.

Carried with acclamation.

The President: I thank you very much indeed.

SOME INJURIES TO THE FLEXOR TENDONS AND SUSPENSORY LIGAMENT.

By PROF. J. MACQUEEN, F.R.C.V.S.

In discussing this subject it is desirable briefly to recall the arrangement and relations of the structures exposed to injury.

Fore limb. The flexor perforans muscle, three times larger than the perforatus, arises from the humerus, radius, and ulna, and extends to near the knee where its tendon begins. The tendon passes through the carpal arch to the middle of the canon, where it is joined by the sub-carpal ligament, then downwards to the fetlock, where it passes through the perforatus ring and over the sesamoid pulley. Descending behind the pastern, under the bifid insertion of the perforatus and over the glenoid prominence and navicular bone, it is inserted on the semi-lunar crest of the os pedis. Slightly compressed at the knee, it is rounder at the canon, considerably expanded and flattened at the fetlock, narrowed though still flat behind the suffraginis, at the os coronæ, to which it is loosely attached, it again expands and rapidly attains its greatest breadth at its insertion. In volume it varies little from its origin to the point of junction with the subcarpal ligament, and below this the increase is hardly noticeable owing to the gradual attenuation of the reinforcing band. At the fetlock the tendon is thicker, and its anterior surface, moulded on the sesamoid pulley, shows some of the characters of fibro-cartilage. Another increase in thickness and firmness occurs at the os coronæ. It appears to be weakest at its terminal expansion which, however, is well supported by the posterior digital ligament.

The Sub-carpal or "check" ligament, a direct continuation of the posterior common ligament of the knee, is united at its origin to the anterior fibrous wall of the carpal arch and the suspensory ligament. Descending, it closely embraces the anterior surface of the perforans, which it appears to join at the middle of the canon. In many instances their fusion is very gradually effected, as some indication of the parts of tendon and ligament can be traced to near the fetlock. The sub-carpal ligament is the strongest portion of the suspensory apparatus of the fetlock.

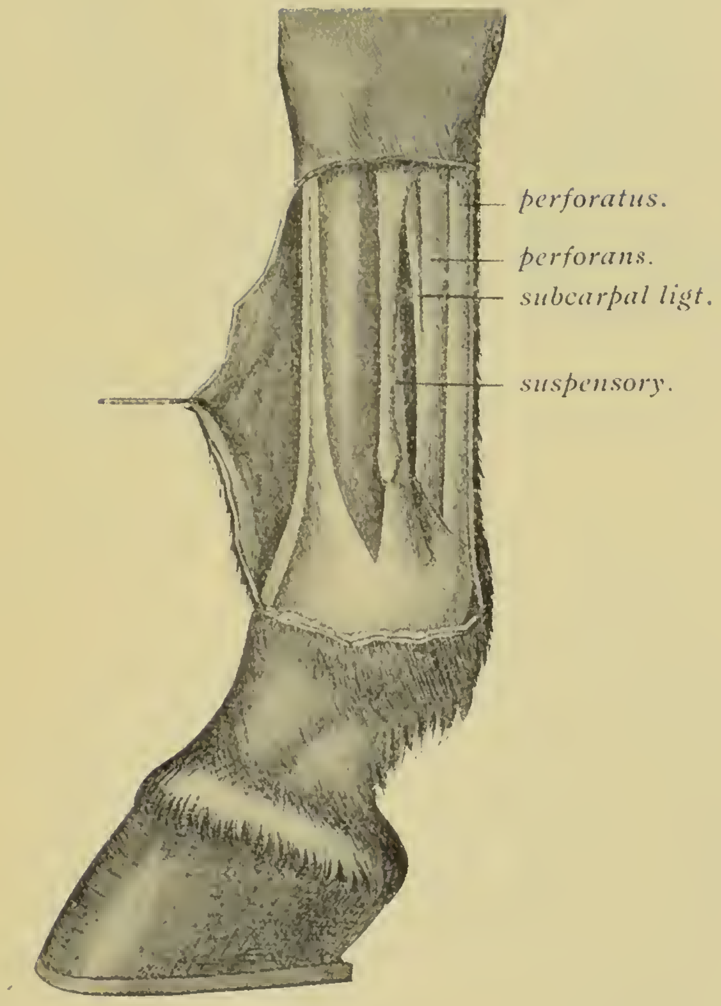
The Perforatus or superficial flexor muscle, arising with a portion of the perforans from the humerus, extends to near the knee where it is succeeded by tendon. In close contact throughout with the perforans, the tendo-perforatus passes through the carpal arch to near the fetlock, where it forms a sheath-like ring for the perforans, then descending and becoming somewhat broader it terminates by a bifid insertion on the os coronæ. Before entering the carpal arch the perforatus is joined by the radial ligament, which hitherto has attracted little attention outside the dissecting room.

The Radial ligament arises from the inner border of the posterior surface of the lower extremity of the radius and extends obliquely downward and outward to join the perforatus tendon. It is a short, rather lax fibrous band, between two and three inches long, about an inch broad, and less than half-an-inch thick. Recently in Germany and France, cases of lameness have been attributed to strain of this ligament.

The Suspensory ligament, arising from the lower row of carpal bones and the head of the canon, descends between the subcarpal ligament and metacarpus to near the "buttons" where it bifurcates. Each branch is implanted on the excentric surface of the corresponding sesamoid, and a portion of each band is continued downward and forward to join the extensor pedis tendon. From its origin to the point of bifurcation the suspensory is flattened and closely applied to the canon, its branches to the sesamoids are rounded, and the extensor bands are flat. It has a covering of connective tissue which attaches it to the canon and flexor aponeurosis. In structure it differs from the tendons by containing fasciculi of striped muscle and some fat.

Hind limb. Apart from their points of origin and a few other differences, the more important features of the posterior flexors are:—the perforans in the tarsal arch is not accompanied by the perforatus; at the upper metatarsal region it is joined by the tendon of the accessory flexor muscle, and near the middle of the shank by the subtarsal ligament, which though longer is less thick or strong than the sub-carpal ligament. The perforatus has a very short muscular portion, and its tendon, beginning just below the upper third of the tibia, after a winding course, reaches the point of the hock, where it forms a cap for the summit of the os calcis. Below the hock the perforatus descends the shank, as in the fore limb, to the os coronæ.

Tendon is made up of groups of parallel white fibrils, interspersed with flattened nucleated connective tissue cells, arranged in rows running in the direction of the tendon fibres. Between the bundles are inter-fascicular spaces, and primary and secondary connective tissue septa, continuous with the peritendinous covering. The nerves (few and non-medullated), blood-vessels, and lymphatics ramify in the septa. The subcarpal and subtarsal ligaments have thicker interfascicular septa and are more vascular than the tendons.



Perforatus and perforans tendons, subcarpal and suspensory ligaments, (after Cadiot).

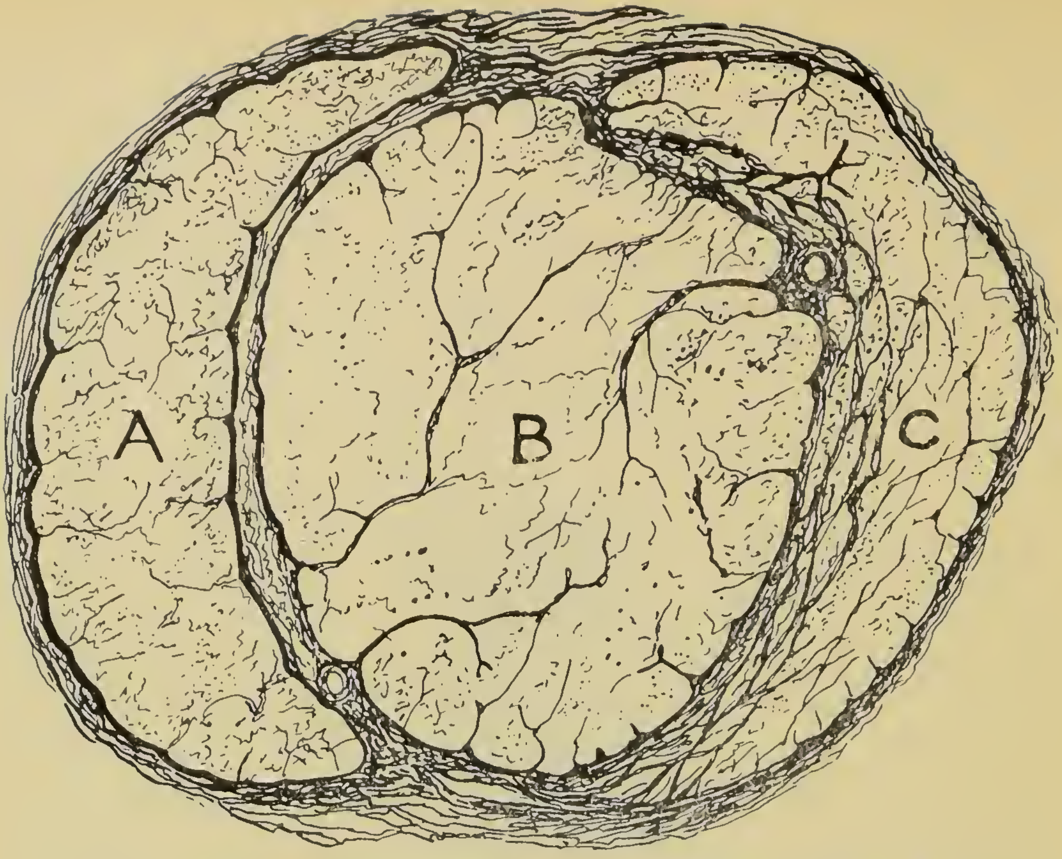


FIG. 1. Section of the flexor tendons of a four-year-old horse, at the point of union of the subcarpal ligament and perforans: A, perforatus; B, perforans; C, subcarpal lig. (after Pader).

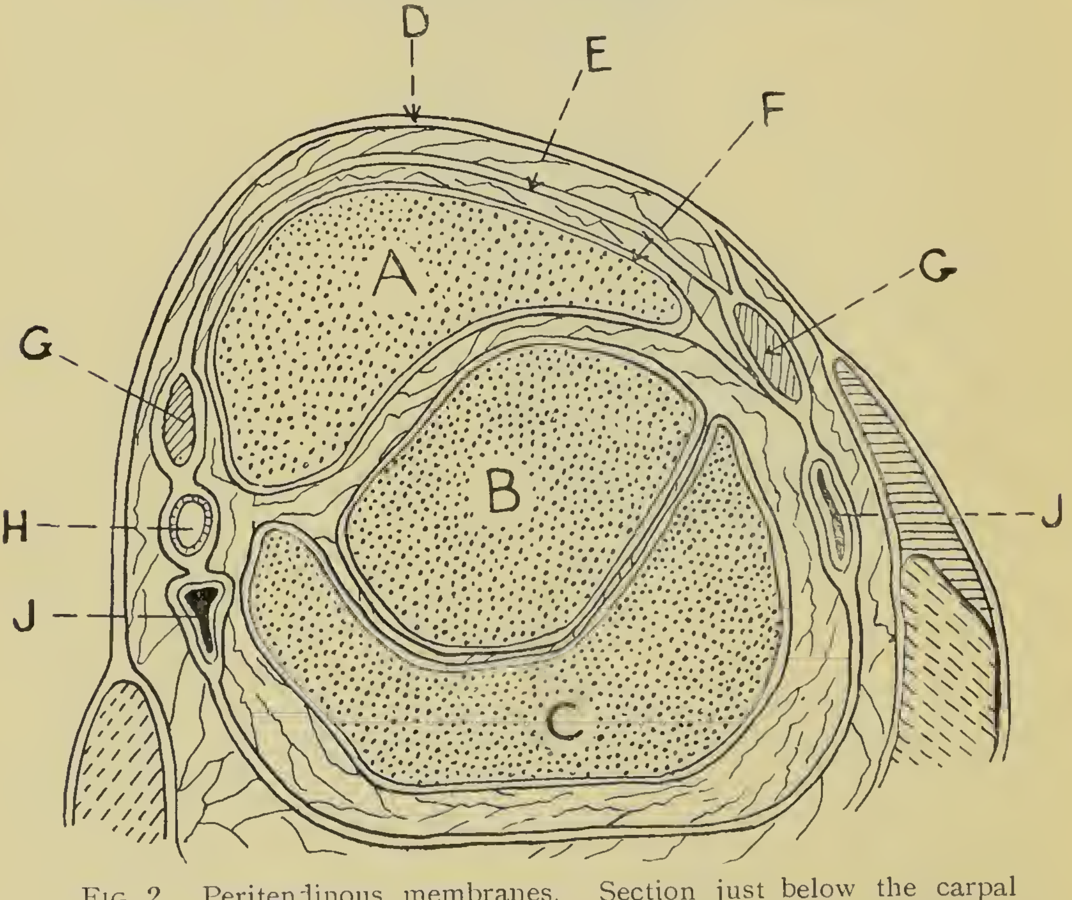


FIG. 2. Peritendinous membranes. Section just below the carpal arch (slightly diagrammatic, after Pader). A, perforatus; B, perforans; C, subcarpal ligament; D, first aponeurotic layer; E, second aponeurotic layer; F, peritendineum of each tendon; G, plantar nerves; H, metacarpal artery; J, veins.

Peritendineum. Each tendon has its own covering of connective tissue. This is composed of several laminæ, more or less united, closely investing the tendon, continuous inwardly with the interfascicular septa, and connected outwardly, according to the part examined, with the visceral layer of the flexor synovial sheath, the common aponeurosis, or the adjoining tendon or ligament. Between its laminæ the vessels and nerves break up to penetrate the interfascicular septa of the tendon.

Aponeurosis. The metacarpophalangean or common aponeurosis furnishes a subcutaneous covering to the flexor tendons and subcarpal ligament, and separates these from the suspensory. It consists of two principal layers of fibrous tissue, united to each other and to the tendons or parietal synovial sheath by areolar tissue and continuous with the posterior wall of the carpal arch and fascia of the forearm. It forms a strong fibrous brace for the flexor tendons at the sesamoids and pastern, and supports and protects the vessels and nerves. In the hind limb the metatarsophalangean aponeurosis is similarly arranged.

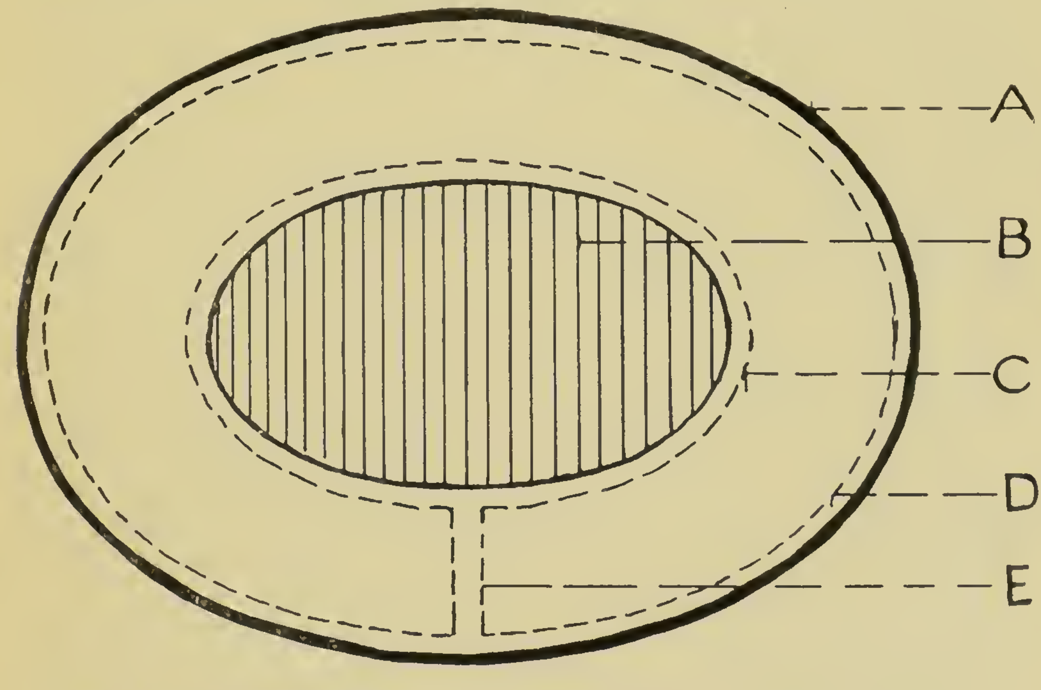


FIG. 3. A, aponeurosis; B, tendon, C, visceral synovial; D, parietal synovial, E, mesotendon, connecting C and D. (Diagrammatic, after Montané).

Synovial sheaths. Facilitate movement of the tendons; consisting of two parts continuous with each other; a parietal, lining the aponeurosis or other supporting tissue, and a visceral, investing the proper covering of the tendon. The opposed surfaces are lined with endothelium.

The carpo-metacarpal sheath, extending from about two inches above carpus to near the middle of the canon, lines carpal arch, and part of metacarpal aponeurosis; reflected on both tendons in the carpal arch and below on perforans, posterior surface of subcarpal ligament and anterior surface of perforatus tendon. From an inch or two below the carpal arch to the upper margin of the sesamoid sheath the perforatus has no synovial on its posterior surface, and the anterior surface of this portion of the tendon is separated by loose connective tissue from the parietal synovial of the perforans.

The great sesamoid sheath extends from the level of the "buttons" to the middle of the os coronæ, where it is separated from the navicular bursa by an attachment of the perforans, lining the aponeurosis and sesamoid pulley and reflected on flexor tendons, being modified at the sesamoids by the absence of endothelium on the anterior surface of the perforans. There is no synovial covering on a portion of the posterior surface of the perforatus, which is united to the aponeurosis of the fetlock.

The navicular bursa or sheath extends from middle of os coronæ to below the navicular bone; forms a short synovial sac between the perforans and the navicular bone and its interosseous ligament.

STRAIN.

Strain, partial rupture of tendon or tendinitis, varies in gravity with the degree of injury, the position of the strain and the cord affected. Strain may be slight and limited to a few axial or peripheral fibres (tendinitis), or severe, and involve a considerable portion of the thickness of the tendon including its connective tissue covering (paratendinitis). In strain affecting few or many fibres the ruptures may occur at one level (short strain), or owing to subsequent tearing or secondary ruptures at different levels, the laceration may represent a sloping breach of the tendon (long strain). In most cases there is a centre of limited rupture, but owing to consecutive inflammatory changes the distension extends above and below the seat of injury. In this way, amongst others, the diffused thickening of the subcarpal ligament and the elongation of the primary distension of "bowed" perforatus are produced.

Position of strain. The perforans, though far less frequently affected than is generally supposed, may be strained just under the knee, at its junction with the subcarpal ligament, at the sesamoids, behind the pastern or in the "heel pan," where it is very difficult to distinguish distension of this tendon from rupture of the digital aponeurosis or bursitis of the synovial sheath. The subcarpal ligament may be strained close to its fusion with the perforans, near its origin below the knee, or towards the fetlock at its real termination. The strain may be short or limited to an inch or two of the ligament, but as there is a constant tendency to extension of the inflammation, most often the distension is diffused.

The perforatus may be strained at the knee, at the middle of the canon, or at the fetlock. Occasionally strain occurs at other points, as within the carpal arch and at the bifurcation of the tendon behind the pastern. Strain of the radial ligament as a primary injury must be very rare, though acute bursitis of the carpal sheath, caused by bruising, sometimes extends to this ligament.

Strain of the suspensory usually occurs immediately above its bifurcation or affects the inner branch. In dilaceration or upward splitting of the suspensory the apparent strain may extend to the upper third of the ligament.

The relative frequency of strain at these sites cannot be positively stated, because cases are seldom seen early enough to permit of accurate diagnosis. But perhaps the commonest strain of the perforatus is represented by "bowed tendon" at the middle of the canon; that of the perforans at the fetlock, and that of the subcarpal ligament near its junction with the perforans.

Regarding the comparative frequency of perforans, perforatus, subcarpal, and suspensory strain there is hardly more justification for confident assertion. However, one may say that in cart horses the subcarpal ligament is more often strained than the perforans, that by extension of inflammation the perforatus is often implicated, and that strain of the suspensory is very seldom seen. In saddle horses, racehorses, chasers, hunters, and polo ponies, strain of the perforatus or of the suspensory is more common than strain of the perforans. Anterior strains are much more frequent than posterior strains.

Statistics and published cases of flexor strain should not be accepted without caution. Repeated examination of the leg is required to distinguish the tendon strained, and in many cases some doubt remains. Poy, analysing 230 cases of anterior strain in horses engaged at fast work, gives 116 suspensory alone, 17 suspensory and one tendon, 34 perforatus, 30 both flexors, 16 subcarpal ligament, 10 subcarpal and one tendon, and 7 perforans. Barrier found the suspensory affected five times in eleven cases, and Jacoulet thirteen times in eighteen cases of strain in saddle horses; and in six months at Saumur, Joly had 75 cases in horses particularly exposed to strain by attenuation of shock: 25 perforatus, 17 suspensory, 17 affecting the tissues connecting the perforatus and subcarpal, 1 perforans, and 8 affecting the tendons without possible distinction. Lesbre, from observations made in the dissecting-room, considers that the subcarpal ligament and perforans are more frequently strained than the suspensory.

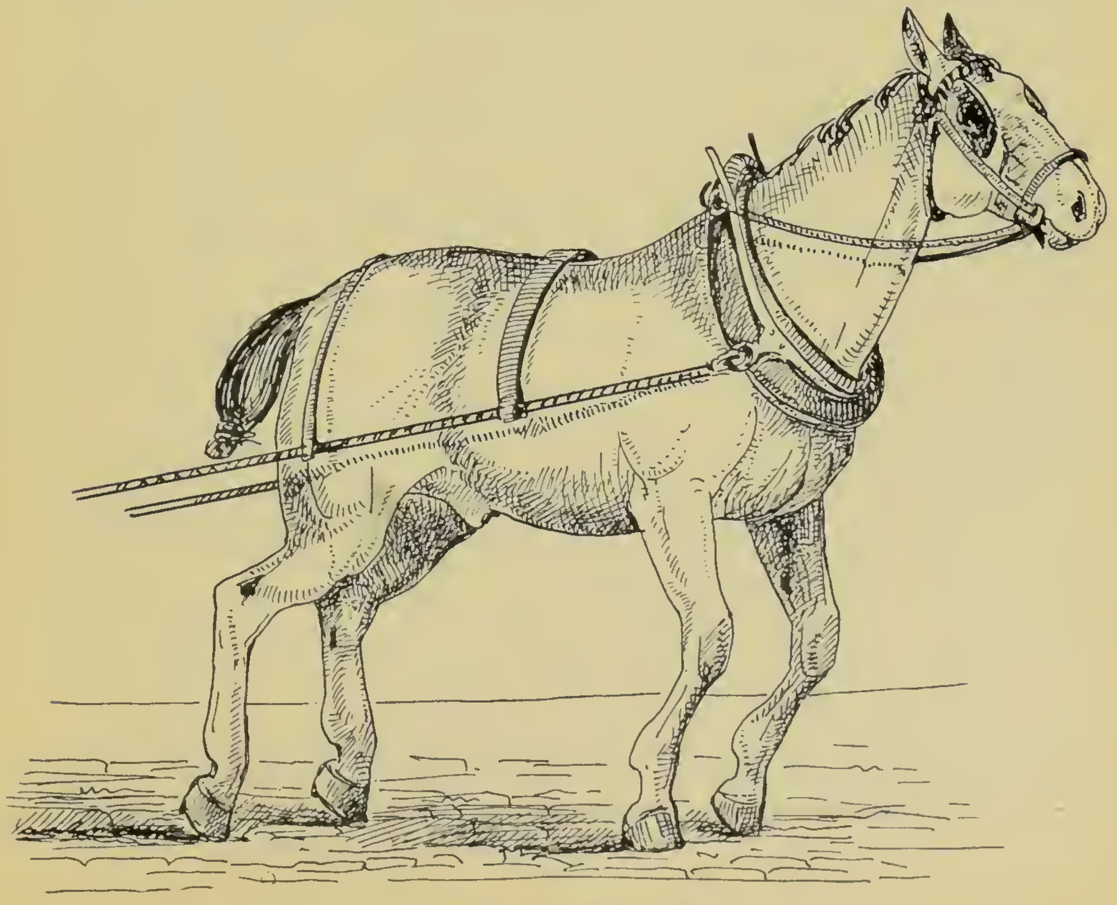
Other observers have found the suspensory affected 24, 50, and 54 times in a hundred cases of strain, and Pader states that probably many cases of apparent distension of the suspensory may be due to *Filaria reticulata*, as in 37 cases of parasitic invasion of this ligament, 13 presented enlargements identical with the lesions of chronic strain. In nine years, according to Fröhner, 36,230 horses of the Prussian Army were treated for inflammation of the flexors and tendon sheaths, and of this number 70 per cent. were affected in both flexors of one limb, and 20 per cent. in the suspensory. The right fore leg was affected in 43 per cent., and the left in 36 per cent. of the cases. Later German statistics give, for one year, 2,695 cases: 1,090 both flexors, 495 suspensory alone, 401 perforans alone, 286 perforatus alone, 120 both flexors and suspensory, 49 subcarpal ligament, 1 radial ligament, and 45 synovitis or rheumatic tendinitis. In the French Army the admissions for strained tendons and fetlocks were 1,080 in 1891, and 3,923 in 1897. In the British Army, with an effective home strength of 21,000 horses in 1907, the admissions for strained tendons were 634, and for strained ligaments 834. Unfortunately the distribution of these strains is not given in the report from which these figures were obtained, but the small number of cases is both remarkable and gratifying.

CAUSES.

Predisposing, or contributing and exciting causes, are recognised, but as many of these appear to be interdependent they will be placed together. Defective conformation is represented by long, upright, or too oblique pasterns, buck knees, crooked legs, and tied-in tendons. Bent knees, especially when congenital, should be excepted, as they appear to save the tendons, and in this belief some owners and trainers prefer horses that lean a little at the knees. Tendons, though thick and apparently strong, may be weak, defective in quality, of unequal density, less resistant, and more liable to strain; these defects being due to heredity, breeding, rearing or dieting. Other causes are premature work or training before complete growth or consolidation of the tendons and ligaments; forced training or pushing the preparation of the young horse; nervous excitability in thoroughbred and some other horses, by inducing more energetic efforts; fast work, especially racing, chasing, hunting, and trotting (perforatus and suspensory strains); muscular fatigue towards the finish of a fast run race or in galloping too far, and weak flabby muscles, by relaxing the flexors and too suddenly throwing the support of the fetlock on the tendons; heavy draught work, starting or backing a load, holding back going down hill, and shunting (subcarpal or perforans strain); antecedent disease, adhesions, with or without shortening, worn tendons, chronic disease of tendon, aponeurosis, or synovial sheath;

hard ground, by increasing the flexion of the pastern and the tension of suspensory and perforatus; heavy holding ground by detaining the foot, impeding movement and increasing effort; ground with a soft or moveable surface-layer as grass after rain, and wood or asphalte when wet or greasy, by causing slipping; ringbone and enlargements of the pastern by hindering or preventing movement of the joints and consequent relaxation of the tendons (perforans strain); long toes and low heels and shoeing with tips predispose to strain of perforans and perforatus. Slipping in the stable or on the road, a false step, and in a tired horse a sudden acceleration of speed may cause strain.

In forming an estimate of the merits of these causes, attention should be given to the action of the fetlock and pastern. The fetlock, with its angle open in front to about 150°, is sustained by the suspensory and supported by the flexor tendons. The suspensory yields a little when the fetlock sinks and regains its former length when the fetlock rises. In movement, the tension of the suspensory is in proportion to the degree of dorsal flexion of the fetlock, and if it is elastic the property of stretching is due to the muscular fasciculi incorporated with its fibrous tissue. Immediate post-mortem examination of the suspensory reveals no sign of special elasticity, and in the thoroughbred during



Forced Traction
Instantaneous photograph (after Goubaux and Barrier).

movement it appears to be rather thicker when tense than when relaxed. Pader holds that the suspensory is not more elastic than the tendons, and Lesbre suggests that the lengthening or yielding of this ligament is more apparent than real because of its bifurcation and the position of its attachments to the pastern. Implanted on the free or outer side of the sesamoids, it acts like a cord suspending the pulley by its axis, and when the fetlock descends the sesamoid mass passes between the branches of the ligament. However this may be, the suspensory acts by a direct pull on the sesamoids, while the flexor tendons furnish a moveable support to the fetlock, and together tendons and suspensory may be regarded as a single power acting at the sesamoids on the lever of the pastern to oppose the descent of the fetlock and closure of its angle in front. In the standing position the weight transmitted through the canon falls on the fetlock where it meets the inclined articular surface of the pastern and is resolved into two parts: one perpendicular to the inclined surface, the other parallel to it. The perpendicular weight exerts its pressure on the pastern bones which neutralise it by their resistance, while the other part, which abuts behind on the sesamoids, tends to force the fetlock downwards by inducing oscillation of the pastern lever with consecutive closing of the metacarpo-phalangean angle. This tendency is overcome by the tension of the suspensory apparatus, which keeps the fetlock in position and preserves its normal angle. In locomotion, when the foot comes to the ground, the pressure supported by the fetlock is represented by the weight of the body plus the force of inertia resulting from the acquired speed. The more rapid the pace the greater the pressure. And while the foot is in contact with the ground the fetlock, at first, is a centre of attenuation of shock and afterwards a centre of impulsion. Its mechanism was investigated in 1891 by Barrier and Siedamgrotzky. Working independently, with the assistance of instantaneous photography, they arrived at very similar conclusions, which as regards the causation of strain may be shortly stated :—When the foot is coming to the ground, the oblique canon forms with the pastern a straight line (Fig. 4, 2). When the foot is in support the canon becomes vertical, while the pastern approaches more or less the horizontal. In virtue of the marked dorsal flexion of the fetlock, the pastern or phalangean lever oscillates in two different directions : forwards and upwards on the canon and downwards on the os pedis and navicular. These two movements of oscillation are absolutely simultaneous, and they produce at once closing of the angle of the fetlock and flexion of the coffin joint. (Fig. 4, 3). But the effect of this closing of angles is different on each flexor tendon. The perforans representing a cord extending from the head of

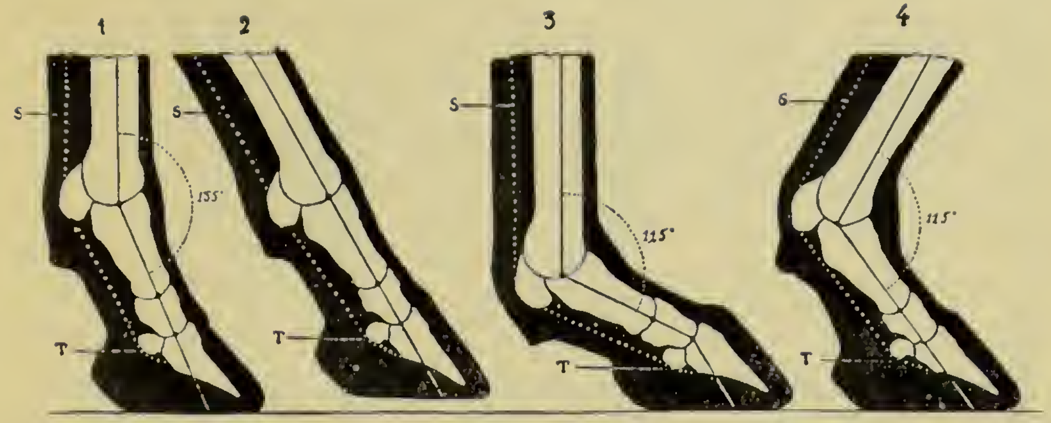


FIG. 4. Respective values of the articular angles of the fetlock and the foot during rest and movement. (Instantaneous photographs, after Barrier). S, suspensory ; T, perforans ; 1, rest ; angle of the fetlock 155 deg., angle of the foot 0 deg. ; 2, coming to the ground ; preceding angles effaced ; 3, middle of the support ; angle of the fetlock 115 deg.. suspensory in tension ; angle of the foot 147 deg., perforans relaxed ; 4, finish of the support ; angle of the fetlock 115 deg., suspensory still tense ; angle of the foot effaced, tendons fully stretched.

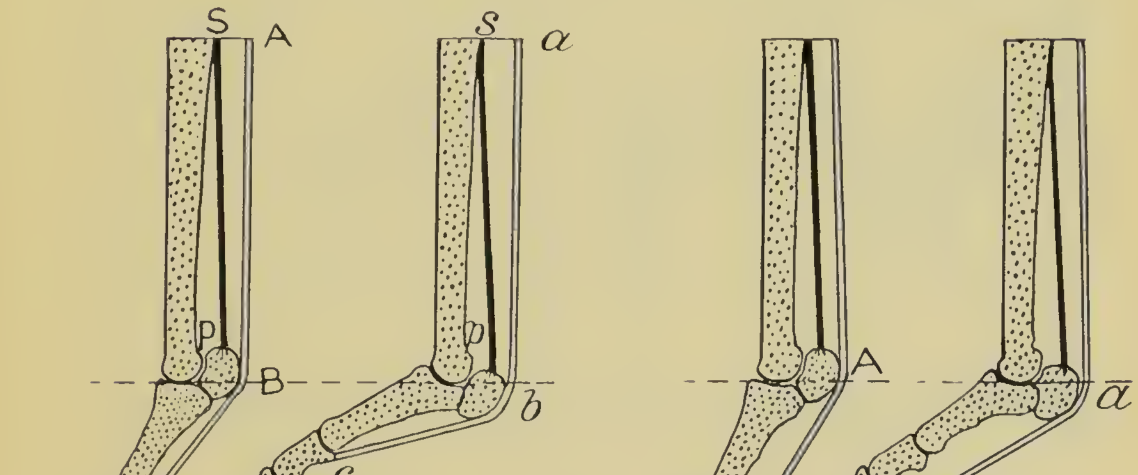
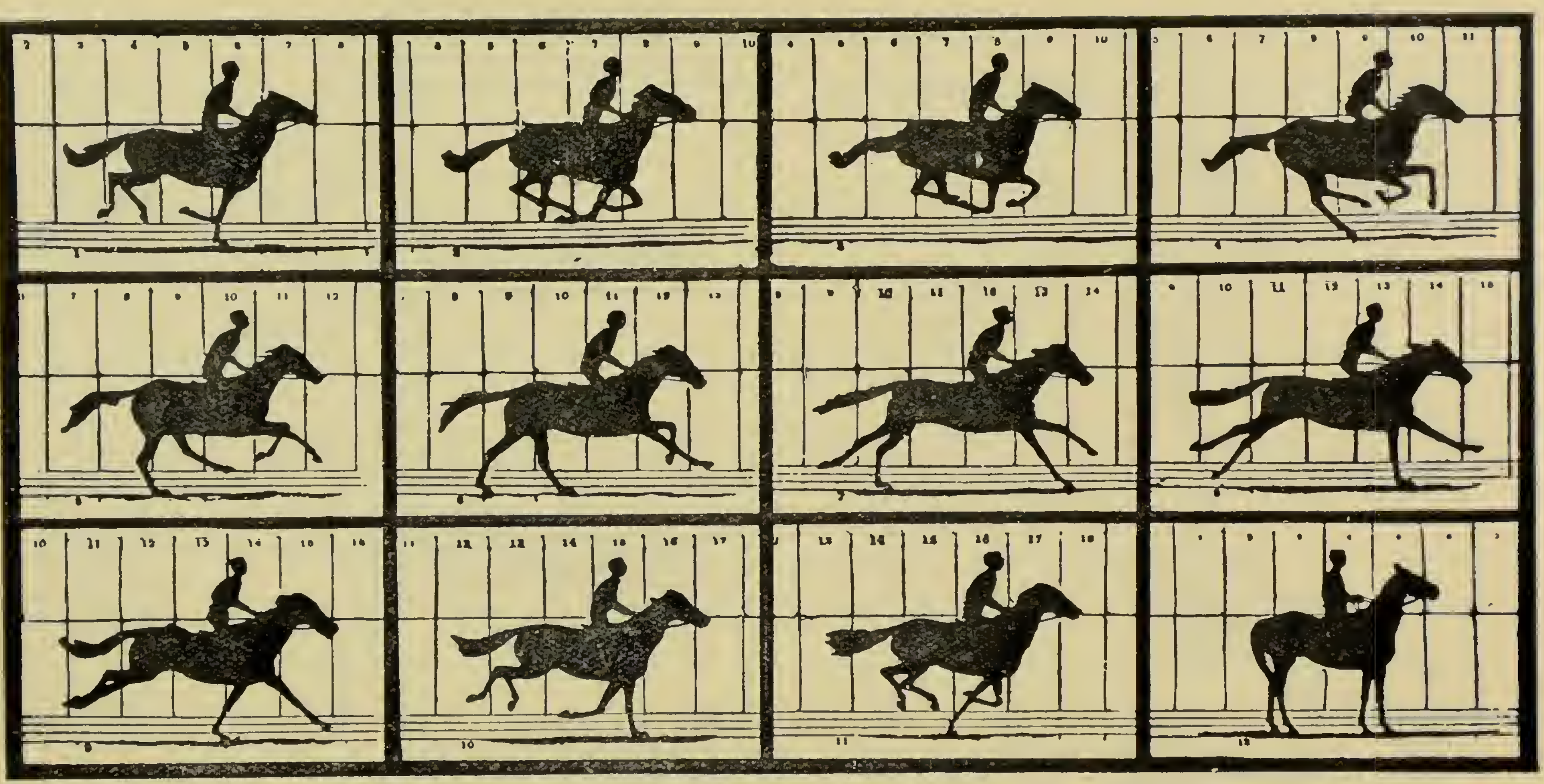


FIG. 5. Showing the effect of movement on each flexor of the foot. (Diagrammatic, after Pader). S, P, (suspensory, foot at rest) is shorter than *s p* (suspensory, fetlock flexed). A B C, (perforatus, foot at rest) is shorter than *a b c* (perforatus, pastern flexed). A B C (digital part of perforans) is greater than *a b c* (same part of perforans but pastern flexed).



Instantaneous photographs of the *racing gallop*. (After Muybridge).

Speed 1142 metres (over 5 furlongs) per minute.—The vertical lines separate spaces 0.582 m. in width. These indicate the velocity of the movement of the body, and measure the extent of the displacements of the members.

the canon (origin of subcarpal ligament) to the os pedis, is relaxed, the inflexion of the pastern having shortened the distance between its two points of insertion. The perforatus, extending from the radial ligament to the base of the pastern is made tense, in consequence of the separation of its points of attachment, and for the same reason it more closely braces the fetlock. Towards the middle of this stage the suspensory reaches its maximum of tension and is most exposed to rupture.

From this moment of the support, the angle of the fetlock effects a sort of forward oscillation, the pastern straightens and the flexion of the coffin joint progressively diminishes, whilst the canon is inclined forwards (Fig. 4, 4). This oscillation of the fetlock and the simultaneous straightening of the pastern have the effect in a fast pace—as a striding gallop—of effacing the angle which was formed at the hoof, and of producing a little greater closing of the metacarpophalangean angle. Under the influence of these two causes the tendons are immediately stretched and quickly reach the limit of their extension. The more extensive the oscillation of the angle of the fetlock on the articulation of the foot the greater the tension of the subcarpal ligament, so that at this instant the least supplementary effort may cause a rupture.

Inferentially these observations may be summarised : (*a*) strain of the suspensory is produced by excessive tension (paratonia) of the ligament at the moment of greatest dorsal flexion of the fetlock, when by inflexion of the coffin joint the semilunar crest is brought nearer the sesamoid pulley and the perforans is relaxed (Fig. 4, 3). (*b*) The perforatus may be strained in the same way as the suspensory, with which it shares the charge of supporting the fetlock when the foot comes to the ground. (*c*) Strain of the subcarpal ligament or perforans is produced by excessive tension (paratonia) of the tendon at the moment of hyper-extension of the pastern during impulsion in fast work or in forced draught (Fig. 4, 4).

In the first stage of the support (Fig. 4, 3) some hesitation arises regarding the action of the perforans and subcarpal and their escape from strain. The very limited relaxation of the perforans tendon at the coffin joint can hardly be sufficient to permit the angle of the fetlock to close to the extent seen in racing, when the ergot almost touches the ground. The tendon is inextensible, and its apparent elongation when the fetlock descends should be referred to the *muscle*. The subcarpal ligament is not constantly tense and it is reasonable to suppose that the perforans muscle is stretched before this ligament is called upon to share the pull on the tendon. In racing and similar fast paces muscles sooner or later become fatigued, and as they are not continuously contracted, when strain of the subcarpal does happen at this stage, most likely the injury occurs during relaxation of the muscle, when the ligament, unassisted by muscular contraction is in extreme tension.

Regarding strain of the perforatus the operation of the cause is not clear. At the fetlock this tendon moves freely on the perforans, and, according to Joly, with the advantage of having watched the action of the naked flexors in a living horse, the perforatus begins to move and comes to rest a little sooner than the perforans, which appears to continue the movement. The perforatus muscle is small, presumably weak and easily stretched, and the radial or check ligament is lax enough to allow for elongation under tension. No doubt partial rupture of this tendon sometimes occurs, but clinical observation suggests that the usual distension—" bowed tendon "—is gradually produced by repeated limited laceration of the peritendinous covering, and that later the body of the tendon becomes affected by extension from the peritendineum (paratendinitis).

Effects of Strain. Coleman taught that sprain is " an inflammation of the cellular tissue connecting the perforatus and perforans together " ; and Percivall, while holding that tendons are incapable of extension and are too firm and strong to sustain hurt from common accident, recognised the fact that they are surrounded by a soft, delicate tissue which must, every time they are forcibly pulled or stretched, be extremely liable to laceration. Since then—excepting those who, perhaps too seriously interpreting the words of the preacher, " he that increaseth knowledge, increaseth sorrow " have been content with offering opinions, very few have taken the trouble to inquire into the nature of strain, and Pader, Veterinary-Major in the French Army, has done more than any other to explain the pathology of tendinitis.

Excessive tension of a tendon causes rupture with retraction of fasciculi, laceration of the peritendinous covering and interfascicular septa, extravasation, and sero-sanguineous exudation. The exudate fills the interfascicular spaces and distends the areolar septa, the hitherto quiescent tendon cells, increase in size and become active, while the damaged fibres are partially converted into a structureless hyaline pulp. Inflammatory reaction is set up and in the reparative process the breach in the tendon is made good by granulation tissue, which is formed by the agency of the tendon cells and the fibro-blasts of the connective tissue adjacent to the lesion. Eventually the new formed tissue undergoes cicatricial contraction. Though tendinitis, caused by strain, is an aseptic process it nearly always produces permanent distension at the seat of injury. Resolution is a possible termination, but in most cases of sufficient intensity to attract attention, repair is imperfect, and after apparent recovery, it is exceptional to find the tendon normal or quite free from adventitious growth. As a rule there remains a nodular or diffused thickening of the tendon or peritendinous covering. A tendon once inflamed is predisposed to relapse, and too frequently, owing to insufficient rest, to position, or to persistent irritation the result is chronic tendinitis.

Post-mortem examination of a chronic or indurated strain of the subcarpal ligament shows in addition to remarkable intrinsic distension of the ligament, considerable peripheral increase from new formation of connective tissue. The suspensory lying in front is not involved, but the borders of the subcarpal ligament are firmly united to the perforatus and its covering by the enormously thickened aponeurosis. This union forms a tube for the perforans which remains free within the synovial sheath. At the point where the subcarpal joins this tendon, and below to a variable extent, the perforans is more or less distended, but above within the carpal sheath, the tendon may be normal, atrophied, or hypertrophied according to the intensity and duration of the inflammation, and the degree of compression exerted by the surrounding new fibrous growth.

Partial atrophy of the perforans may result from chronic inflammation of either the subcarpal ligament or perforatus. Hypertrophy may be due to a compensatory cause, the perforans, owing to failure of the perforatus or one of the ligaments, being more actively engaged in supporting weight. But sometimes the increase in thickness is pathological and due to tendinitis either primary or arising by extension from the subcarpal ligament, perforatus, or aponeurosis. The metacarpal vessels and nerves running through the thick fibrous growth under stress of increasing compression may be injured, and in fact the wall of the metacarpal artery is much thickened, and the nerves including the branch which crosses the perforatus are expanded and flattened, but otherwise they appear normal. Sclerosis, arteritis, and phlebitis of the vessels, and sclerosis and perifascicular exudation of the nerves, have been observed by Pader, and he suggests that possibly this interstitial neuritis may contribute to the lameness.

Similar peritendinous alterations with ultimate ossification of the fibrous growth occur in connection with chronic tendinitis of the perforans at the fetlock, usually of the hind limb. The rupture occurs between the sesamoids and the os coronæ, where the perforans is constricted and relatively weak. The tendon presents a diffused distension extending above the sesamoids and forming a notable prominence behind the pastern. The synovial sheath and aponeurosis, inflamed and thickened, appear more seriously affected than the tendon. Some observers, probably impressed by the more obvious lesion, maintain that synovitis precedes the tendinits; but Siedamgrotzky, after numerous inves-

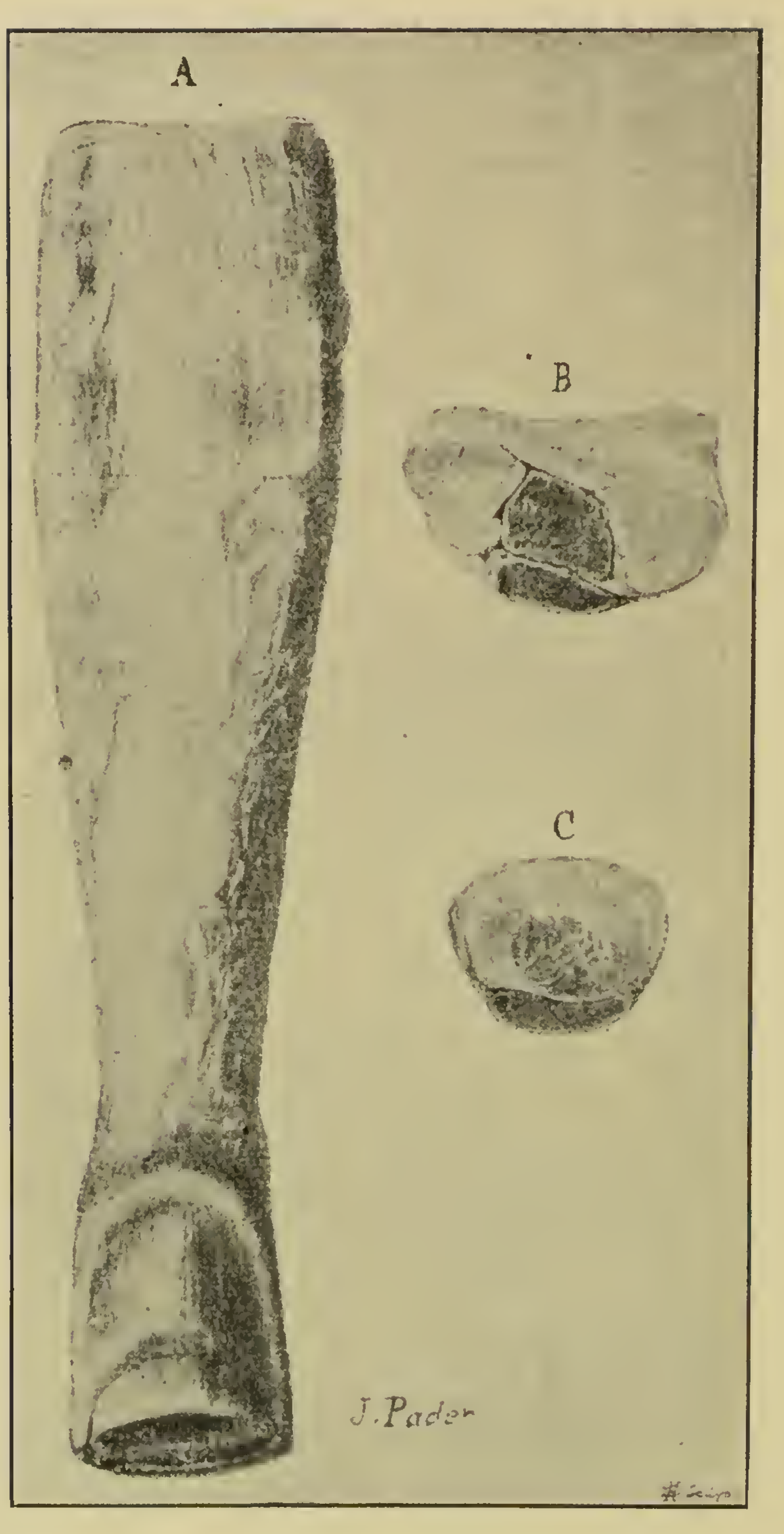


FIG. 6. A. Thickened subcarpal ligament, with tendons; B. Section towards superior third, perforans still distinct; C. Section towards the inferior third, perforans confounded with the subcarpal. (After Pader).

tigations, held that in every case of chronic inflammation of the sesamoid sheath accompanied by lameness and tumefaction, the perforans has been partially ruptured, and that the synovitis is the result of extension from the tendon. Post-mortem examination of a chronic case does not reveal the order of attack. Both tendons and the synovial sheath may be affected, the perforans by distension, the perforatus by peritendinous increase, and sometimes the aponeurosis shows more extensive alteration than either the tendons or synovial sheath. In the forelimb, at the perforatus ring, the perforans alone may be distended coincidently with inflammation of the sesamoid sheath. In this case the synovitis appears to precede the tendinitis, which invades the sesamoid surface of the tendon.

Tendinitis of the perforatus at the middle of the canon usually arises from a very limited initial injury of the tendon or the peritendinous covering. At first the leg is merely filled or œdematous over a portion of the tendon, and the lameness, not very marked, disappears with the swelling under rest and bandaging. Gradually, however, the tendinitis extends, the swelling becomes firmer and persists in spite of bandages and simple remedies. At this stage careful treatment may arrest the progress of the inflammation, but in most cases insufficiently rested the peritendinitis invades the aponeurosis, the borders of the perforatus become united to the subcarpal ligament and permanent distension and adhesions extend far beyond the seat of primary injury.

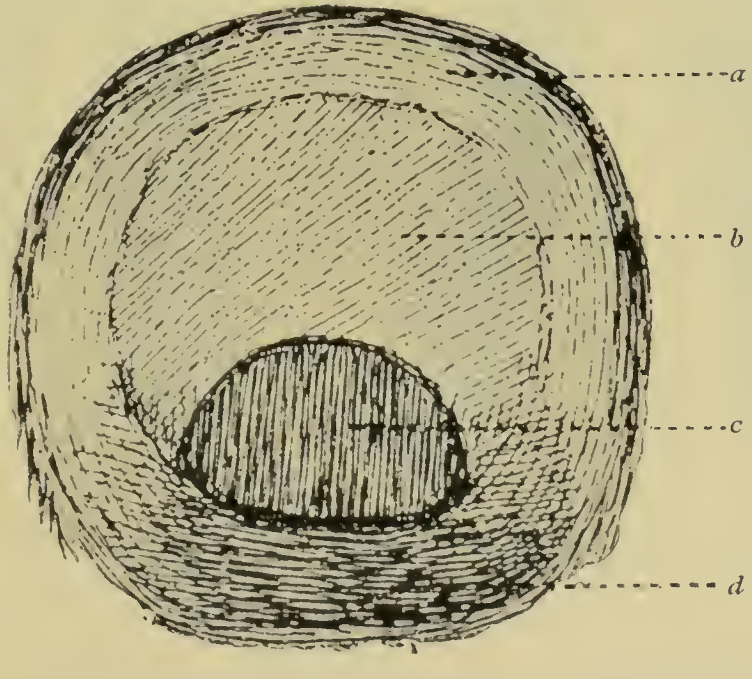


FIG. 7. Distension of the perforatus at the middle of the Canon, (after Pader). *a*. Thickened peritendineum; *b*. Perforatus distension; *c*. Perforans slightly atrophied; *d*. Subcarpal ligament.

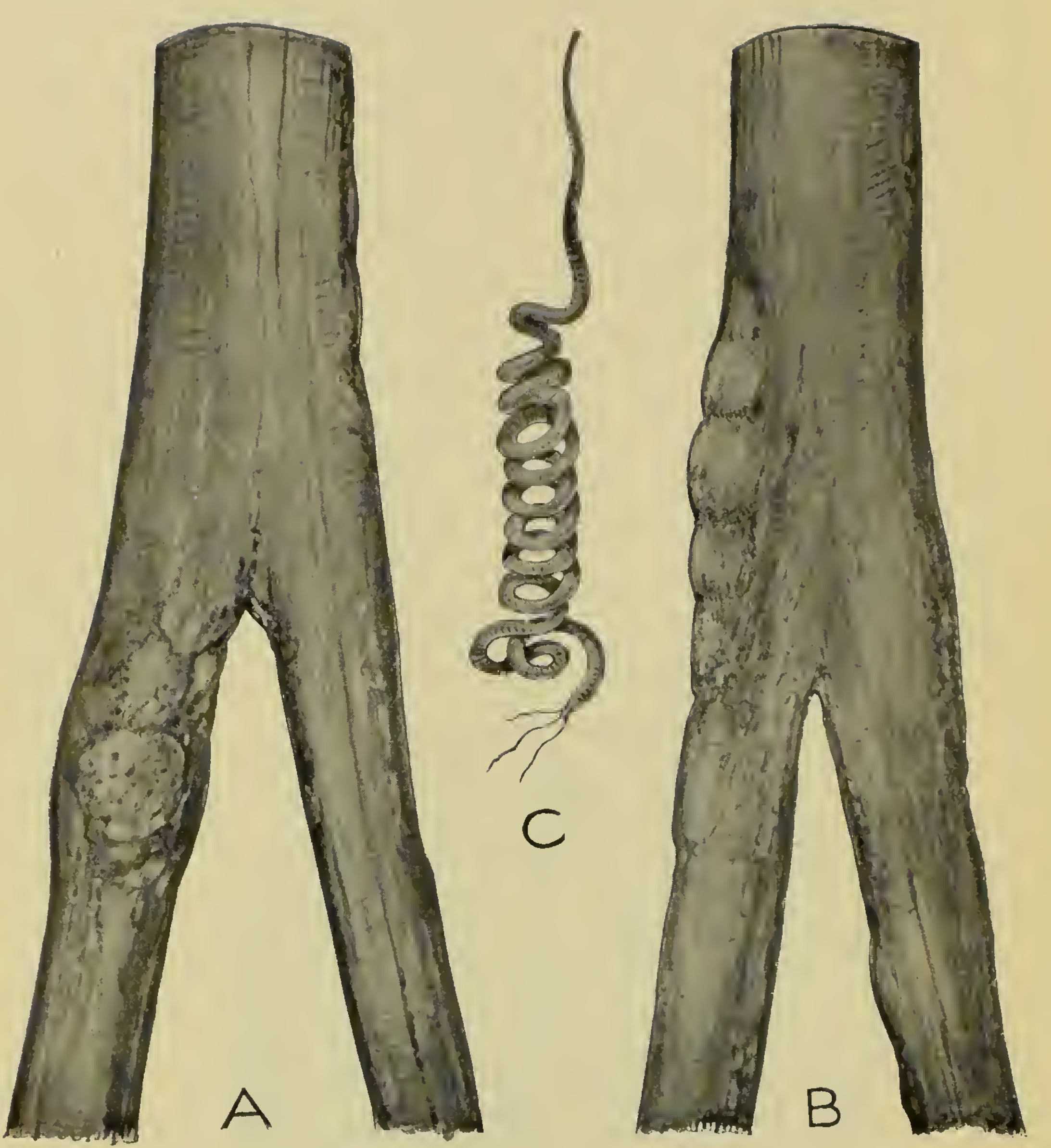


FIG. 8. A. B. Showing parasitic nodules of suspensory ;
C. Portion of parasite. (After Pader).

In high strain and in strain at the fetlock, the distension of the perforatus is complicated by synovitis of the carpal or sesamoid sheath, which always aggravates the lameness and retards recovery.

Here mention may be made of those cases of "diffused thickening of the flexor tendons" of one or both fore or hind limbs. The leg from knee or hock to fetlock is enlarged over the tendons by persistent, firm, not very sensitive swelling, without abrasion or lameness, and causing no inconvenience beyond raising the heels slightly off the ground. In this condition the tendons are not really thickened, but the aponeurosis and peritendinous covering form a dense fibrous shield which appears to interfere very little with the movement of the flexors. What is the cause? Wear and tear, constitutional weakness, heredity, or what? Though sometimes referred to rheumatism, the alteration gradually produced is so painless in its progress and effects that one hesitates to accept this explanation. A more feasible answer may be found in the effects of excessive work, and probably the chronic peritendinous thickening arises from the stress of constant heavy traction in cart horses, and from jumping and prolonged galloping in hunters and other saddle horses.

In strain of the suspensory above its bifurcation the distension at first is lax and compressible, but as repair advances the injured part becomes harder. Its connective tissue covering participates in the inflammatory process, but the peripheral increase is less extensive than in flexor strain. The recessed position of this portion of the ligament and its separation from the subcarpal and tendons by the aponeurosis and a connective tissue layer possibly explain the frequent escape of the tendons from invasion. But in strain of one of its branches the consecutive inflammation not only distends the suspensory but extends through the medium of the aponeurosis to the perforatus and lateral sesamoid ligament and produces one-sided chronic enlargement of the fetlock.

Parasitic invasion of the suspensory and perforatus has been observed in Austria, Russia, and the South of France. The parasite (*Filaria recticulata*) in excavating galleries causes the formation of painless nodular enlargements of the ligament, which may be mistaken for old-standing distension.

Filariosis of the suspensory has been investigated in Russia by Tchulovski, and in France by Pader, and a full description of the condition will be found in the *Journal of Comparative Pathology* for December, 1908. In one district Pader examined post-mortem 43 horses, asses and mules, and found 35 affected in various degrees; and Tchulovski had 51 cases in 53 horses examined at Kazan. Apparently, while active, the parasites weaken the resistance of the suspensory and predispose it to strain or rupture. After a time the parasites perish and the lesions are repaired, but the ligament remains more or less enlarged. So far the writer has not been able to find a suspensory with the parasite. In a few foreign bred ponies the ligament of one or both forelegs has been found nodulated as in filariosis, but the cause could not be ascertained. In this country owners are not readily persuaded to sacrifice useful animals to gratify surgical curiosity.

Symptoms and Diagnosis. The symptoms of strain being familiar, only a few will be referred to here. Diagnosis bristles with difficulties fully appreciated by the writer, who being himself unable to see clearly, can hardly show the way to others. Every strain is accompanied by the usual signs of inflammation, and soon after the injury, swelling, pain, and increased heat of the strained part are discoverable. These symptoms, as well as lameness, vary not only with the measure of the inflammation but to some extent with the position of the strain and the tendon or ligament involved. Lameness is more marked in subcarpal or perforans strain than in strain of the suspensory or perforatus. Severe strain of the subcarpal or perforans appears to be much more painful than other strains of equal extent or intensity. The horse walks lame and may be unable to trot. In strain of the perforatus ("bowed tendon") or suspensory, walking, may be free from nodding, and trotting may be comparatively easy. The difference in degree of the lameness exhibited in the two cases is due partly to function, and partly to synovitis which is almost a constant accompaniment of perforans strain, and only an occasional complication of strain of the perforatus. Excepting an inch or two at the mid-canon and at its termination, the perforans tendon throughout is invested by synovial membrane, while the perforatus is only so covered in places. The horse's action may be suggestive, but in few cases does action alone warrant the diagnosis of strained tendon. Inspection of the lame leg, except in recent bowed tendon may mislead, and a case sometimes occurs in which the exception should be disregarded to avoid error. Painful oedema over the tendons is helpful, but its many causes unconnected with strain should be considered. Manipulation of the injured region is most useful in forming an opinion of the nature of the case, and there is no better method of arriving at a differential diagnosis of the cord affected. In practice the advantage of distinguishing the strained from the unstrained tendon or ligament may not be very great, treatment varies very little, and often the diagnosis "strained tendon" is sufficient, and perhaps it is fortunate that the horse owner in this particular is not more exacting. Differential diagnosis of many cases is extremely difficult and of some impossible, even after repeated examination of the leg. But bearing in mind that in most of the commoner strains, the inflamed peritendinous tissues establish an intimate and more or less extensive connection between the tendons, a comprehensive view may be taken by anticipating probable extension of the tendinitis to parts which are neither distinctly normal nor yet clearly affected. In this way lies safety in diagnosis. The observer may be confident and fully justified in diagnosing strain of the subcarpal ligament, and at the same time quite unable positively to state whether or not the perforatus or perforans is also implicated, but his experience of similar cases should enable him to affirm that the perforatus will not escape.

In diagnosing strain just under the knee, the subcarpal, perforans, perforatus, carpal sheath, and the aponeurosis merit consideration.

Firm painful swelling near the canon and extending four or five inches downwards usually denotes, in the carthorse, subcarpal strain, and in others, strain of the perforans with synovitis of the carpal sheath. Superficial swelling extending upwards and distending the carpal arch generally arises from perforatus strain, and when the tumefaction is one-sided and very painful, external injury may be the cause. Clipping the hair over the tendons facilitates further examination. By flexing the knee and tracing singly the ligament and tendons, a centre of tendinitis will be discovered. Later, in a week or two, the inflammation having extended, while a diagnosis of strain can be safely made, uncertainty remains as to the cord primarily or mainly affected. In strain of the subcarpal ligament at its junction with the perforans, the resulting distension appears to involve the tendon as well as the ligament, but post-mortem examination shows, at least in a few cases, that the lesion is restricted to the portion of ligament that is joined to the tendon. In young horses lame from high splint oedema may extend to the adjoining aponeurosis and excite suspicion of flexor strain. Doubt will be satisfied by applying a bandage which generally removes the swelling.

Strain of the perforatus at the middle of the canon may develop insidiously, or it may be shown by immediate conspicuous engorgement over the tendon. The slowly progressive case, at first may be overlooked, because there is very little interference with function, but the other at once attracts attention. The horse is very lame, and the swelling, quickly formed, may have to be reduced before the nature of the injury can be ascertained. Usually the strain is severe and accompanied by acute tendinitis, which rapidly produces fusiform deformity of the tendon with extensive peritendinous thickening. The progressive case begins by the formation of a warm, slightly painful, compressible swelling over the tendon. This may be attributed to a blow, but there is no abrasion; though the absence of signs of contusion on a leg bandaged at work should not altogether exclude external injury as a possible cause. If arising from strain the oedema diminishes or disappears under bandages and re-forms when the leg is left uncovered. Lameness is hardly noticeable, and the horse may not be rested. In time, depending on the degree of injury and the horses' work or exercise, the swelling extends, becomes harder, and does not yield to lotions or bandaging. The tendon and its covering are inflamed, and short or elongated permanent distention will result. Owing to various causes, the horse is kept going, meanwhile peritendinitis extends, further laceration may occur, adhesions form, and eventually the condition of the leg and increasing lameness enforce rest and treatment.

Differential diagnosis of strain at the fetlock, fore or hind, is seldom easy. Occasionally and only at the beginning, a case which appears to represent a flexor strain may be entirely due to synovitis of the sesamoid sheath, and as the perforans cannot long escape invasion, the cause of lameness may be puzzling. The condition of the inflamed synovial sheath hinders exploration of the tendons. Both flexors may convey the impression of distension, while only one is inflamed ; and in the chronic case paratendinitis (aponeurosis and synovial sheath) prevents intimate examination of the parts. Sometimes the position of the fetlock or the heels assists in the diagnosis of suspected flexor strain. Synovitis with knuckling, the foot resting flat on the ground, suggests perforans strain ; synovitis with raised heels points to perforatus strain, and paratendinitis or aponeurotic thickening ; and synovitis with knuckling and raised heels to tendinitis of both flexors. Firm painful swelling over the flexors below the sesamoids usually arises from perforans strain, complicated by synovitis and paratendinitis, and much of the thickening or bulging behind the pastern proceeds from changes in the aponeurosis. In some cases there is distension of the inferior sesamoid ligaments.

Recent suspensory strain may be recognised very easily, but diagnosis of the chronic case of branch strain may be rendered very difficult owing to adventitious growth and adhesions. The affected ligament should be traced, in the raised limb, and compared with a healthy one. Distension caused by strain is rapidly formed and always more or less diffused. Lameness varies and considering the condition of the ligament, it may be little marked. After rest and treatment functional recovery is the rule.

Prognosis of Strain.—The discussion of prognosis, in the absence of the horse, is unlikely to be profitable and this part of the subject will be passed with the remark that of the various strains, considered functionally and economically, subcarpal is the most serious. The others placed in the order of diminishing importance are perforans, perforatus, suspensory. This order should not be regarded as inflexible, but merely as the outcome of experience of average cases.

TREATMENT.—Treatment of a recent case comprises rest, which too often is ridiculously short and inadequate, raising the heels, warm fomentations to mitigate pain, ease tension and promote absorption ; douching with cold water, hosing the leg, or applying lotions of ammonium chloride, magnesium sulphate, sodium chloride, zinc acetate, alum, or lead subacetate, to remove congestion, lower local temperature, modify the inflammation and hasten absorption of the exudate. Ice poultices and continuous irrigation with cold water have similar effects, while warm moist compresses renewed every half-hour are strongly recommended by Möller, and dry uniform compression by means of cotton wool and bandages by Hunting. A thick layer of a mixture of hard and soft paraffin containing white lead or finely powdered Epsom salt applied to the strain and covered with cotton wool and a bandage is said to be beneficial. Evaporating lotions, anodyne liniments and astringent pastes are also employed; but probably encasing the shank with cotton wool held securely in position by an elastic or rubber bandage and keeping the horse as far as possible at rest will be found equally efficacious. The early treatment of an acute case continued for from four to ten days or longer lessens or removes the oedema, heat and pain, and isolates the firm, more or less extensive and still sensitive distension, which is now in process of repair. For some time the lesion remains apparently stationary and though the preliminary remedies, supplemented by hand rubbing or massage may be continued, a cold water bandage or a compress soaked in saturated solution of Epsom salt applied to the leg night and day may be found sufficient to prepare the case for more active treatment.

Massage as a therapeutic measure in human and veterinary practice was introduced by Girard, Veterinary Surgeon to the Imperial Guard of France, in 1857, and its rational application to strained tendons has been explained by Waldteufel. He uses an antiseptic pomade composed of lard, 250 parts, cresyl, 10 parts, to which water, 100 parts, is gradually added and thoroughly mixed to form a cream. After smearing the swollen part with the pomade, massage proceeds by very gently rubbing, from below upwards, all round the strain to unload the vessels and to remove extravasation. Progressive pressure with the palm or the palmar surface of the thumb and fingers should then be applied to the strained or painful parts, and always in the direction of venous return. After rubbing for 15 minutes or so the part becomes softer and less sensitive. Then the pressure should be stronger and the movements of the hand accelerated for a further 15 minutes. Massage should be practised for half-an-hour once or twice daily according to the case, and in the intervals the leg should be bandaged. This treatment gives excellent results in cases associated with much œdema.

Stimulation or resolvent treatment is indicated in the stationary period while repair is taking place, or in two or three weeks after the accident, but some practitioners, immediately after diagnosis, apply a mercurial all over the strained region. The favourite agent is oleate of mercury or diluted mercurial ointment.

Frohner recommends the treatment which he saw employed at the Imperial Stables, Vienna. After the usual preliminary applications to the strained part, the hair is clipped and the skin washed and disinfected, then biniodide of mercury ointment (1 to 4 or 5), is rubbed in thoroughly for 15 minutes, and covered with absorbent cotton and an ordinary bandage, which are allowed to remain in position for two weeks. After 24 hours the bandage becomes moistened with exudate which soon dries. By resorting to this method the application of the cautery to chronic cases may not be required.

Cagny, with a large racing practice, in the treatment of strain, in place of vesicants and sometimes firing, employs subcutaneous injection of a drachm of rectified oil of turpentine to which he adds a small proportion (1 in 50) of a five per cent. alcoholic solution of guaiacol, to render it aseptic and to diminish the pain following the injection. This method produces much additional swelling and frequently abscess formation, which, however, is seldom serious. He claims that the results are as good as those obtained from vesicants or firing, the leg is not permanently blemished and this remedy is more easily applied than the cautery, but he admits that some horses are much agitated for several hours after injection, a few refusing to feed for two or three days ; that the œdema may be so enormous as to prevent all movement for a week and that it is slow in disappearing.

For perforatus strain, Joly, of the Training School, Saumur, in 1901, introduced the treatment by peritendinous insufflation of filtered air, followed by massage. The operation, carried out with due regard to antiseptic precautions, may be performed in the standing or recumbent position. A tourniquet is applied to the forearm. The air drawn through iodoform gauze is slowly injected by means of a Potain's aspirator furnished with a fine needle, which is pushed into the subcutaneous tissues over the distension on the posterior line of the leg. When the air has penetrated the healthy, œdematous or indurated tissues of the strained part, the needle is withdrawn and the puncture closed with collodion. Next day the insufflated region should be gently kneaded to drive the air, which tends to spread excentrically, into the meshes of the inflamed tissues. Massage is repeated morning and evening at the most distended parts and finally the leg is douched with cold water. By this method, Joly states, that the effects of peritendinitis are rapidly and radically reduced, and that the indurated centre of tendinitis is quickly isolated and often reduced as well. In 15 days, in certain cases, the tendon has become perfectly cool, clean, insensitive, and resistent to the effects of work. Insufflation is useless for old-standing extensive induration of tendons, but for cases passing into the chronic state repeated injections followed by massage or counter-irritation may bring about functional recovery.

Chronic strain cannot be cured, though usually an attempt is made by further treatment to render the horse workable. With owners and veterinarians cauterization is the favourite remedy, but perhaps it is less popular than formerly, and it cannot be described as a specific for strained tendons. Superficial firing, in lines or by budding, when useful at all is most successful in simple cases, but of the many strained tendons fired in this manner the advantage to the horse has seldom been very marked. Deep line-firing probably is more beneficial than any other mode of cauterization, but whether it acts by inducing the formation of a more extensive subcutaneous œdema or by merely exciting cutaneous inflammation with consecutive compression of the strained part, is not known. Firing in points, the needle penetrating the induration, has a very limited application. Pyro-puncturing may be justified on the assumption that it reproduces deep-seated inflammation and establishes a further process of repair and consolidation of the distension. But unfortunately for the success of this method, it promotes the formation of adhesions between the skin and subjacent tissues, and shortening of the tendon, disadvantages that detract much from its value as a remedy for strain. Besides, deep puncture firing is dangerous where a synovial sheath exists, and an operation that may produce open synovitis should not be undertaken without due consideration. For perforatus strain at the middle of the canon and strain of the suspensory, puncture-firing is useful enough.

Neurectomy. When other treatment fails, neurectomy should be tried. Frequently it is too long delayed. It enables a horse that has become useless from chronic strain to work moderately for a year or longer according to the case. But like other treatment, neurectomy has its limits of usefulness. It does not arrest the tendinitis which after operation may become aggravated. It does not prevent, while it may hasten shortening of the tendon, and in some cases it does not entirely remove the lameness, which is said to be mechanical. It is not advisable for saddle horses, and for heavy draught horses, while permitting profitable disposal, it does not give satisfaction. Notwithstanding these objections neurectomy should not be neglected in suitable cases of chronic strain.

Fibrolysin (Merck). This patented drug is said to be composed of thiosinamine (obtained from mustard oil) and salicylate of soda. It has the reputation of possessing the power to soften cicatricial tissue and to prevent its contraction. Kratzer, Jonk, and Oppenheim have reported favourably of its effects in the treatment of thickened tendons. Fibrolysin may be administered hypodermically, intra-venously, or by intra-muscular injection. The dose is 11·5 c.c., five to fifty injections, according to the case, at intervals of two or three days are required, and the cost is not prohibitive. If further trial should prove that fibrolysin can cure thickened tendons and other indurations the future occupation of Veterinary Surgeons will be assured.

Already this paper is too long, and although at its inception the writer intended to include details of knuckling and its treatment with the other diseases of tendons, only a summary of toxic tendinitis, complete rupture, wounds and bruises will be given, and mainly to promote discussion.

Toxic Tendinitis or Tenosynovitis.

Provisional definition: inflammation of the flexor tendons or the flexor synovial sheaths, or both, in young and aged horses and usually arising from antecedent systemic infection.

May follow or accompany influenza, strangles, purpura, pneumonia, glanders, nasal catarrh, laminitis, lymphangitis, castration, wounds, etc. In foals may be primary or congenital, contracted from the dam, and complicated by myositis of the flexors.

Toxic inflammation of *tendon* is denied by some who admit the occurrence of toxic synovitis of the flexor *sheaths*. Both forms affirmed by others who maintain that the synovitis precedes the tendinitis. Symptoms and effects are variable; in foals bent knees, knuckling, or sinking of the fetlocks, œdematous tendons, swollen fetlocks and pasterns, knees, or hocks; unthrifty condition.

In older horses there is diffused painful swelling—no part thicker than another—of flexor tendons of one or both fore or hind limbs; synovitis of sesamoid, carpal, or tarsal sheath; lameness, knuckling, constantly lying down, sometimes marked sweating, and progressive emaciation.

Prognosis is generally favourable in foals; doubtful in older animals, in which rapid recovery may follow indifferent treatment, or the case, in spite of every attention, may linger for months, with thickened tendons, lameness and chronic knuckling. Prevention has not been tried.

Curative Treatment, local and systemic, the latter is of chief importance. For the foal good hygiene, intensive dieting, tonics and antiseptics; locally, plaster or starch bandages to support, or flannel bandages to protect the fetlocks. For older patients, potassium iodide, sodium salicylate, salol, quinine, antistreptococcic serum may be tried; locally, at first, warm or cold applications, compresses, fomentations; later iodine ointment, blisters, oleate of mercury, and, if required, cauterization.

Complete Subcutaneous Rupture of Perforans, Perforatus, or Suspensory.

May be simple, involving one cord; double; or multiple when both flexors and suspensory are ruptured; spontaneous or primary, when affecting a clean and apparently healthy tendon or suspensory; acquired or secondary, when following neurectomy, tendinitis, synovitis, contusion, gathered nail, or fracture.

Position varies; perforans, at the pastern, near its insertion, or at the sesamoids. Subcarpal ligament (?); perforatus, a few inches below the knee, at the fetlock, or towards its insertion. Suspensory, one or both branches near sesamoids. Upward splitting of body of ligament sometimes included with rupture.

Complications.—Fracture (sesamoids, navicular, suffraginis); synovitis, carpal sheath (perforatus and (?) subcarpal), sesamoid sheath (perforans, perforatus, suspensory); and navicular bursa (perforans); rupture of fetlock joint capsule, extravasation.

Causes.—Sudden violent hyperextension exceeding the limit of resistance of tendon or suspensory; prolonged galloping, with muscular fatigue; carrying too much weight; violent struggling when cast; excitement and pressure during service (both fore flexors in mare); jumping in hunters and chasers, foreleg (flexor or suspensory), hind leg (suspensory); synovitis of sesamoid sheath (perforans); tendinitis; neurectomy (perforans); gathered nail (perforans), navicular disease, etc.

Symptoms.—These are very variable. In spontaneous rupture, sudden lameness or loss of power, horse unable to go on, limb advanced or held up, acute pain, horse very restless, sometimes kicking violently, and in kicking may luxate a hoof or more than one; rapid engorgement extending above and below the seat of rupture. Secondary rupture may be preceded by swelling of the pastern or leg, or it may take place without premonitory sign. In the stable, the horse may be found with the fetlock lowered or the toe turned up, showing very little uneasiness. At exercise, the horse may stumble or fall at the moment of rupture, when lameness and the deformity of the fetlock attract attention. If examined immediately after the accident, the ends of the rupture can be felt, but later, owing to swelling, diagnosis may be doubtful. When the leg is under weight, in perforans rupture the fetlock sinks and the toe turns up; in perforatus rupture the fetlock is knuckled or unaltered; and in suspensory rupture the fetlock descends, and the foot rests flat on the ground. In double flexor rupture (suspensory intact) the fetlock descends and the toe turns up; and when the three cords are ruptured (complete breakdown) the fetlock and pastern rest on the ground. In rupture following tendinitis with peritendinous adhesions, the fetlock at first may sink very little or not at all, but later it descends as the adhesions become more and more stretched or lacerated. Occasionally after a severe gallop or jumping trial a fore fetlock sinks and swells posteriorly as if caused by rupture of tendon or ligament. On post-mortem examination both flexors and suspensory are found intact and the only discoverable lesion is a thickened aponeurosis. What is the explanation? Is the sinking of the fetlock due to elongation of the flexor *muscles*, or to rupture of the aponeurosis which supports the fetlock?

Prognosis.—The discussion of the prognosis of complete rupture, like that of partial rupture, to be useful, requires the presence of the patient. Generally, however, the prognosis is favourable in single, uncomplicated primary rupture of suspensory or perforatus, and less favourable but not hopeless in bilateral rupture of either cord. It is exceedingly doubtful in perforans rupture, and in cases following neurectomy or gathered nail slaughter is imperative. Rupture complicated

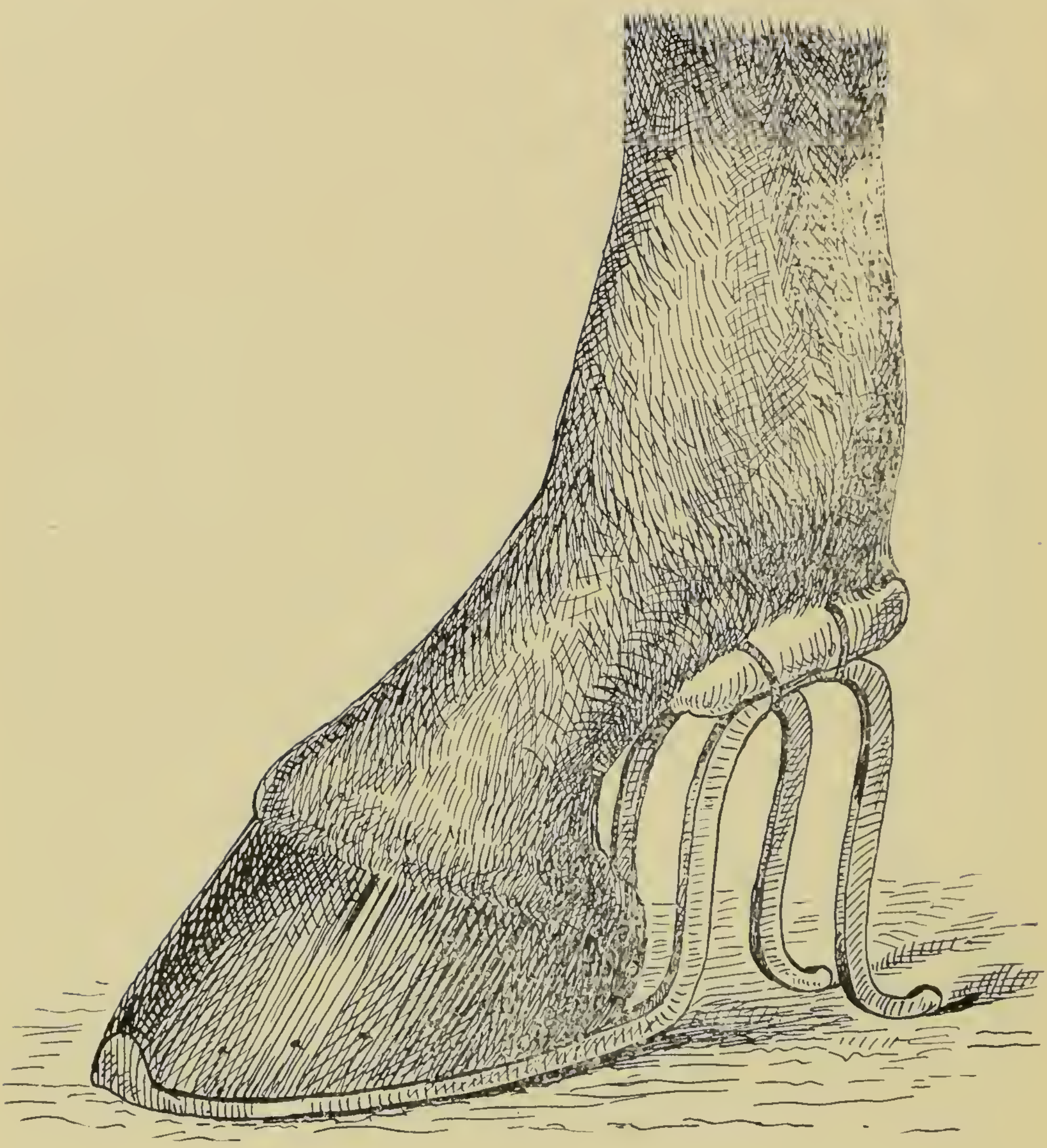


Fig. 9. Bourgelat's shoe with swan's neck support for the fetlock.

by sesamoid or other fracture while not always incurable is usually sufficiently serious to suggest slaughter. Sometimes the value, sentimental or exhibition, or the breeding of the animal, if entire or a mare, prevents immediate slaughter of an apparently hopeless case, which eventually makes a useful recovery. Uncomplicated cases of single or double spontaneous rupture should not be too hastily condemned so long as the owner is willing to risk the cost of prolonged keep and treatment.

Treatment. Rest need not be emphasised, but the length of rest required should be made clear to the owner; if the case is promising, and the horse is to resume fast work he should have a year. Less may be sufficient, but more may be advantageous. A long rest furnishes the best means of ensuring success or of escaping failure in the treatment of injured tendons. In most cases slings are useful, if only for a week or two, and when the fetlock is much lowered a surgical shoe should be employed. Anodyne, refrigerant and astringent lotions or compresses to diminish the pain and swelling, then plaster or starch bandages to assist in supporting the fetlock, and after an interval, bandages having been discontinued, the leg may be blistered or fired.

Wounds and Bruises of Flexor Tendons.

Wounds may be superficial or deep, incised, lacerated, contused, or punctured. Wounds, (1) involving skin and subjacent connective tissues; (2) exposing tendons, with or without open synovial sheath; (3) with laceration of tendon and sheath; (4) with section of one or both tendons; (4) contusion of skin and peritendinous covering with or without bruising of tendon; (5) contused wound with section of tendons and suspensory. Effects and complications vary with the character, position and depth of the wound,—hæmorrhage, which is often troublesome, dermatitis, cellulitis, emphysema, peritendinitis, tendinitis, infection, open synovitis of sheath, suppuration, necrosis, sloughing, open joint, phlebitis, neuritis, limited anæsthesia, periostitis, fracture (unsuspected), exfoliation, etc.

Causes. These include kicking in harness or in the stable, a leg in the manger or over the collar shank, street accidents, a blow from a hind foot or from another horse, stab by stable fork, over-reach in jumping or galloping, falling in jumping, failing to clear fence, wall or gate, splinters, nails, barbed wire, reaping machine, harrows, glass, flints, thorns, firing, ulcerated heel, gathered nail, etc.

Symptoms. The local symptoms depend upon the nature and extent of injury. Wound may be very ragged, irregular and bruised, with a portion of tendon protruding, or clean cut, transverse or vertical, or sometimes lateral with partial section of tendons, and exposure of the canon and splint bones. Constitutional disturbance may be absent or the horse may be fevered, blowing, restless, sweating, refusing food, unable or unwilling to lie down, and resenting interference with the wound, or offering little resistance.

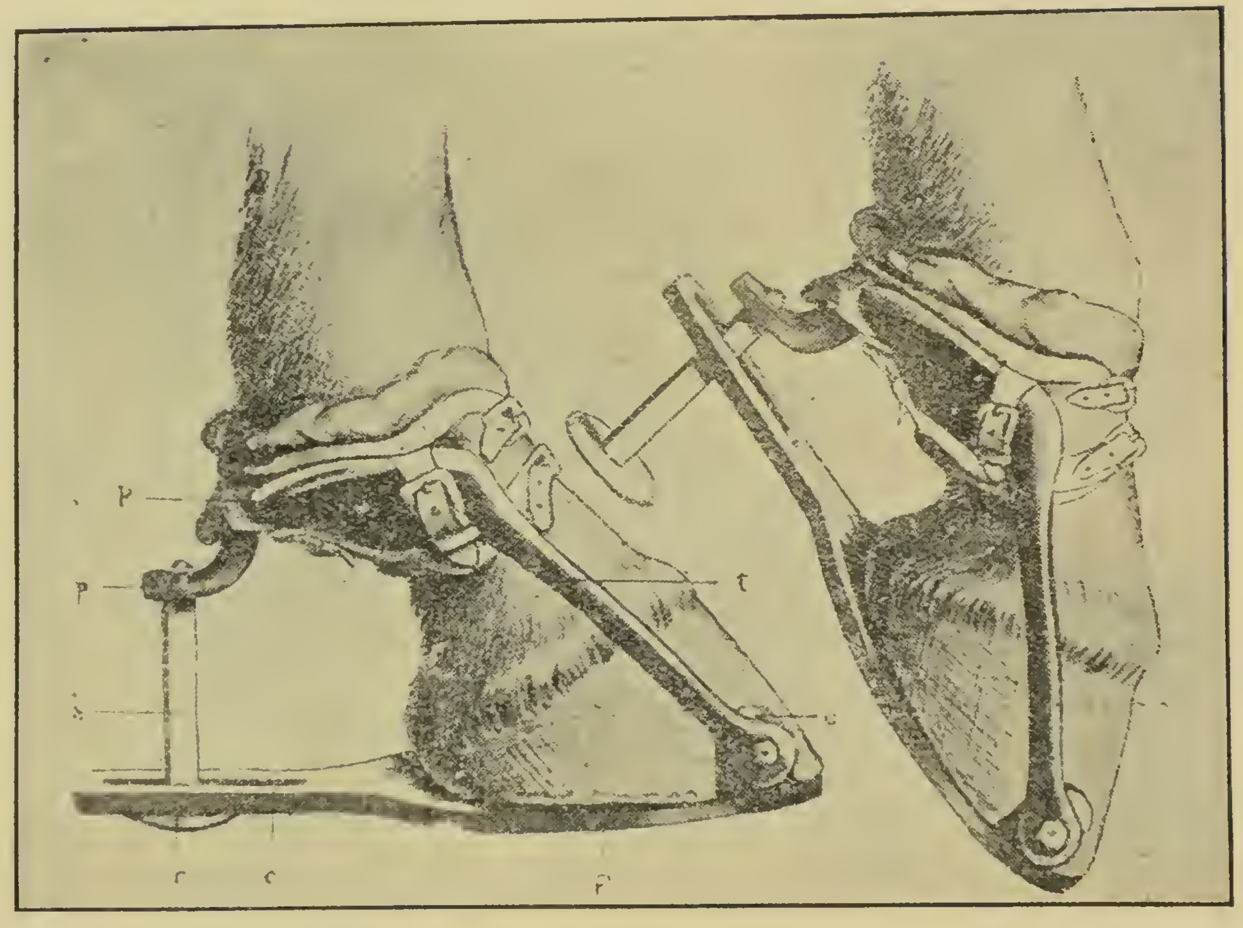


FIG. 10. Defay's apparatus for supporting the fetlock.

Prognosis of contusion is generally favourable though lameness may be protracted; wounds are more doubtful, though surprising recovery may follow treatment of a very unpromising case. Frequently the leg though functionally useful is permanently blemished. Cases complicated by suppurating synovitis of a sheath or by open joint are very grave, often compelling slaughter. Complete section of both flexors is not altogether hopeless, though the result may be unsatisfactory, owing to shortening and knuckling, or to fixation of the tendons. Complete section of the perforatus alone is much more hopeful, but when complicated by suppuration the horse may have to be destroyed. In laceration or partial section the damaged tendon may subsequently rupture from necrosis, which is not easily arrested. Excessive granulations may hinder or prevent healing; and during the treatment of a case the opposite foot may fail from laminitis, or the opposite fetlock may sink from the effects of fatigue.

Treatment.—Throughout this should be antiseptic. The wound may be closed at once or treated by the open method. Dry or moist antiseptics, injections, and continuous irrigation with cold water passed through gauze are employed. Bleeding should be stopped, the hair clipped and the wounded part thoroughly cleansed and disinfected. Suturing the skin and saving pendant portions are advisable, if only to diminish blemishing. In cases treated by the closed method, drainage should be provided, as well as a thick layer of absorbent cotton or gauze, and bandages which ought to extend from the coronet to above the wound. Movement should be restricted as far as possible and if necessary the horse should be placed in slings and the fetlock supported by a surgical shoe or by a thick plaster bandage round the pastern. If the wound suppurate, dress more frequently, and if pus accumulate below the lower margin make a counter-opening and carefully disinfect. If a synovial sheath has been opened treat like an open joint. If granulations interfere with healing, discontinue bandages and apply dried alum, zinc chloride, or weak formalin; or a zinc plate secured by a gauze bandage. If the exposed tendon is lacerated trim it; if completely severed raise the heels and support the fetlock, and if either end of the divided tendon protrude reduce it and trust to sutures or bandages to keep it in place. When the protruding end of tendon is soft, swollen or pulpy it should be resected. After the wound has closed the injured part may be blistered or fibrolysin may be tried, to improve the appearance of the leg.

Discussion.

Prof. J. R. U. Dewar, in opening the discussion, said: I rise with some trepidation to open the discussion upon this excellent paper which has been prepared for us by Prof. Macqueen. The reason why I have been asked to open the discussion on this paper I presume you will all know as well as I do: it was simply because they could not get anybody else to do it. However, I happen to have a good deal of the pachydermatous order in my composition, and will just try and do as well as I can and say as little as possible. I must congratulate the Professor upon his paper; it is written in his own particular, concise, and correct style, a style which no one else need attempt. It is the longest paper of the four, yet notwithstanding its length, after we have read it we begin to think there are some other things we should like to have heard the Professor upon. However, he could not go through the whole chapter in connection with the limbs and ailments of the horse, and considering the small section to which his attention was limited he has really done very well. I do not know whether we are confined to any particular time in connection with our remarks, but if I should begin to break any of the rules I hope the President will let me know, because I think it is my duty, once I am here, to say something, and if that something is not always very apposite, it is at least for the purpose of keeping the ball rolling. I will run through the paper and make some remarks as I go along. On page 22, at the paragraph beginning "Hind limb," the Professor refers to the subcarpal ligament, and then refers to the subtarsal, and says that the subtarsal ligament, though longer, is less thick or strong than the subcarpal ligament. Now that is putting it very mildly. It is very much less thick and strong as a rule, in fact, in some dissections you have to look carefully for it or you might put it aside as simply aponeurosis or cellular tissue. I pass over the paper until we come to the subject of strain on page 26, and here I might mention that Prof. Macqueen seems to avoid the word "sprain." He mentions it once in connection with the late Professor Coleman, but in other places he always uses the word "strain" and avoids the word "sprain." I do not know whether he thinks that the word "sprain" should be ejected from our vocabulary, but it is a very convenient one. Although sprain and strain are sometimes used synonymously they are not exactly synonymous. You may have strain to a very great extent without injury, but you could not have sprain without injury; at least I think it is understood generally in the profession that a sprain is practically an excessive strain where there has been, as the Professor describes it, some laceration of fibres of the structure of the tendon. He defines it here as partial rupture of tendon, or tendonitis. I cannot agree with him. The two terms are not synonymous at all. You have to have the rupture before you have the tendonitis, and you may have the rupture a very considerable time before you have the tendonitis, and the less vascular the tissue is in which the strain and laceration takes place the longer you will be before you have the tendonitis or inflammation. Therefore it is easily accounted for why in what I may term the looser ligaments, such as the subcarpal, you have swelling sooner than in the perforans or suspensory. The fibres are much closer together and the tissues are much less vascular. Coming to page 27 there is an expression there on which I should like a definition. In the middle of the page Professor Macqueen says, "Regarding the comparative frequency of perforans, perforatus, subcarpal, and suspensory strain there is hardly more justification for confident assertion. However, one may say that in cart horses the subcarpal ligament is more often strained than the perforans, that by extension of inflammation the perforatus is often implicated, and that strain of the suspensory is very seldom seen. In saddle horses, racehorses, chasers, hunters, and polo ponies, strain of the perforatus or of the suspensory is more common than strain of the perforans." I am pretty conversant with horses and horsey men, but I really do not know what the Professor means by "chasers." It is the first time I have heard the expression in connection with a horse. I know that away up in his native country, amongst his native hills, the shepherds apply the term to a masculine sheep which does not show any genital gland on the surface of the body, and when it is amongst other sheep, especially of the opposite sex, you can easily understand, without my dilating upon it why the shepherds apply the term "chaser" to that animal. I have been exercising my ingenuity to know what this "chaser" could be, and I was wondering whether it could be the name of an improved breed of the equine species on which the professorial staff of the Camden Town School chase each other round the quadrangle in their leisure moments. Perhaps the professor will explain when he comes to reply.

In the next paragraph we get statistics about the frequency with which the different tendons and different ligaments are strained, or sprained, or injured, and he quotes from Poy 230 cases, and you will find that he has strain of the perforatus only in about 16 per cent of them. In the next sentence he quotes Joly, who had only 75 cases, but found strain in the perforatus in about 33 per cent. That is a fine illustration of how doctors differ. I do not for a moment believe there has been this difference in the actual lesion, but the difference shows the difficulty of diagnosis. Unless one sees the injury almost immediately after it is inflicted, it is very difficult to localise it so exactly as to be able to tell whether it is the perforans or the perforatus, the subcarpal ligament or what. I will give you a good illustration. I have myself had a dislocated metacarpal bone, which very foolishly I treated myself. I knew what had happened and I tried to reduce it myself—closed my eyes, clenched my teeth, and made a big snap at it, but I was not satisfied. I went to the best surgeon in Scotland with it within three hours, and I offered to let him put me under chloroform or anything he liked. He examined it carefully, and assured me there was no displacement. He was perfectly confident and had every reason to be satisfied, and said he could do nothing for it, but rest and all the usual thing. You can see it still here to-day. That is an illustration of the difficulty of diagnosis, and I think this quotation from Poy and Joly only illustrates, as it were, those difficulties.

Turning to page 28 we come to the causes of these injuries, these strains, these sprains. I can only agree with the Professor in one cause mentioned, which I look upon as very fertile in the production of these strains, that is muscular fatigue, or in horses over-straining. Take a horse that is not fit for work, as it were, that has been long idle, and put him to do hard work and that is the time you will get strains. If you have had a horse on a long journey and he has become over-tired he will be liable to strains, just the same way as a horse will stumble and fall after a long journey, unless you pull him up on his legs he comes on his knees, because the muscles are all tired, the tendons are not kept taut, and that is the time we are most likely to have strains. There is an expression at the foot of the page "Worn tendons." I hope the Professor will excuse me being so ignorant, but he must take into consideration that we cannot all be learned professors and therefore I should like to know what these terms mean. I am doubtful about this, "worn tendons." I know what worn legs means, but I was wondeaing whether the tendons wear in the same way that rope wears when it gets chafed on the outside until there is practically nothing left. Does he mean that? He will explain to us no doubt afterwards.

Still going on with the causes of strain, the Professor refers to the subcarpal, and mentions ringbone and enlargements of the pastern by hindering or preventing movements of the joints and consequent relaxation of the tendons, perforans strain. Now I wonder whether you have observed, as I have done, that it is very seldom that we get a strain in the subcarpal ligament, which, as the professor well says is so connected with the perforans, but that there is nearly always some ringbone or some fullness about the coronet. I am not very sure but what that is antecedent to the sprain or the injury or the lesion of the tendon or ligament. I think that a horse when suffering from a tender part about the pastern, in trying to save himself from pain, may injure the tendon; the tendons are strained very much in the same way as a horse over-tired is apt to injure or strain his tendons.

In the next paragraph the Professor tells us that the suspensory yields a little when the fetlock sinks and regains its former length when the fetlock rises. He says, "In movement, the tension of the suspensory is in proportion to the degree of dorsal flexion of the fetlock, and if it is elastic the property of stretching is due to the muscular fasciculi incorporated with its fibrous tissue. Immediate post-mortem examination of the suspensory reveals no sign of special elasticity." Then he goes on to argue for all he is worth that there is no elasticity in the suspensory ligament or any other ligament, and he proves it over and over again in the course of his paper that they are elastic. I was taught there was no elasticity in them, but I do not believe a word of it. You can see it for yourselves if you go out into the street and lift the fore leg of a well bred cab horse: you will see the opposite fetlock will sink immediately the additional weight is thrown upon it. It is due to elasticity, due to a term which the Professor uses, which puzzled me some time, "The centre of attenuation of shock." The Professor should try and use language suitable for the common average practitioner like myself. I certainly believe there is a certain amount of elasticity in these ligaments, and I think the Professor will have very grave difficulty in demonstrating the presence of very much muscular tissue in the suspensory ligament. There is no tissue in the body—I am not very sure even in the teeth—which is not more or less elastic. Even the bones, the long bones in young animals, are more or less elastic. You will get green-stick fracture in the young animal, but not in the old one. There is elasticity in the bones, but more in the tendons and ligaments I will guarantee. You will see a well-bred foal, not many days old, with its hind fetlocks coming to the ground, but in the course of two or three days, if the foal thrives, it is up and gambolling about like a spring balance. Is there not elasticity in it? I am perfectly confident that all the tissues are more or less elastic.

A little later on the Professor says, "The perpendicular weight exerts its pressure on the pastern bones which neutralise it by their resistance, while the other part, which abuts behind on the sesamoids, tends to force the fetlock downwards by inducing oscillation of the pastern lever with consecutive closing of the metacarpo-phalangean angle." Now this is very high-flown language, gentlemen, and I had some difficulty in understanding it, and I do not yet understand what the Professor means by this oscillation. Oscillation, as I take it, is a moving backwards and forwards, something like a pendulum of a clock, or like a man hesitating which way to go. In that connection I might mention an anecdote. A man in the country was trying to get past the public house, and after considerable difficulty he managed to do so. Then he congratulated himself. He said to himself, "Well done Jock—come on back and I will stand you a dram" (Laughter.) There was no hesitation or oscillation there. I think the Professor in his translation has been trying to be too literal, and has adopted a wrong word which does not convey the exact meaning of the original writer. He seems to have fancied this word, and uses it over and over again, but I think he should discard it as he discarded "sprain." However, I have not the least doubt that he will put us right.

Just a little below that we come to an expression which puzzled me for a long time: "The more rapid the pace, the greater the pressure." We can well understand that. But then he goes on, "While the foot is in contact with the ground the fetlock at first is a centre of attenuation of the shock, and afterwards a centre of impulsion." It was this "attenuation of shock"—I could not understand what the Professor meant by that. I puzzled my brain over it for some time, and I found afterwards that it means the elasticity of the tissues, the giving way, as it were, so that the shock is not so great. If you try to ride a horse with exceedingly short pasterns, especially down hill, you will understand what shock means, whereas with a thoroughbred with good long and oblique pasterns and some elasticity in the suspensory ligament there is some attenuation of shock and the seat is very much easier.

Still further down the page he has the word again: "In virtue of the marked dorsal flexion of the fetlock, the pastern or phalangean lever oscillates in two different directions." I do not see that anything can oscillate without being in two different directions. He goes on to say "forwards and upwards on the canon and downwards on the os pedis and navicular," and he says these two movements of oscillation are absolutely simultaneous—I agree—and that they produce at least closing of the angle of the fetlock and flexion of the coffin joint. Now, he takes no note at all of the articulation of the pastern. I do not know whether he means there is no oscillation in it at all; perhaps he will tell us later. He goes on to say, "But the effect of this closing of angles is different on each flexor tendon. The perforans representing a cord extending from the head of the canon (origin of subcarpal ligament) to the os pedis, is relaxed, the flexion of the pastern having shortened the distance between its two points of insertion. The perforatus, extending from the radial ligament to the base of the pastern is made tense." I agree with this so far, if you do not assume that the word "relaxed" means an actual relaxation so that there is no tension on the tendon at all. I do not for a moment believe that is the case. It has a shorter distance to go owing to the flexion of the joint, but it has a muscle at the other end of it to pull in the slack and keep it taut, and we have the subcarpal ligament which, as the Professor has told us very well in his paper, is softer and more pliable than some of these tendons, a ligament that gets out of the way when it is not wanted, what we used to call the check ligament, to check the over-lengthening of the tendon. I cannot adopt the view that there is relaxation in the ordinary sense of the term. I believe when this takes place the perforans tendon is still assisting the perforatus, and the suspensory ligament in the support of the limb.

Towards the middle of the page Prof. Macqueen says, "The suspensory reaches its maximum tension and is most exposed to rupture," and I cannot understand this expression at all. I should think it was at the end of the stage when it was at the most extreme tension, when you had the dorsal angle, as it were, of the fetlock reduced to its minimum that you would be most likely to get rupture of the suspensory ligament. In a paragraph later on the Professor tells us that the tendon is inextensible—we have differed on that already—and that its apparent elongation when the fetlock descends should be referred to the muscle. I believe that the muscle is as little elastic as the tendons. Muscle contracts, but when the muscle is relaxed and there is no contraction upon it I do not think you can make it much longer without producing some injury, lesion or strain.

Coming to the effects of strain, here is the only place I think that the Professor uses the word "sprain." He says Coleman taught that "sprain is an inflammation of the cellular tissue connecting perforatus and perforans together." As I told you I do not use the word "sprain" and "strain" as exactly synonymous, and I might agree with Prof. Coleman. But to say that strain and tendinitis are the same is very much the same thing as another expression in connection with our profession which is often used as a synonym, namely, "traumatic arthritis" and "open joint." We can have "traumatic arthritis" without having "open joint," but we have much oftener open joint without having traumatic arthritis. It is very much the same with the strain of the tendon and the tendinitis, in my opinion.

Going further on in the paper, the author refers to the parasite which has been sometimes found by a foreign veterinary surgeon in the suspensory ligament. He says that he has not found it himself—neither have I, and I do not think it can exist very often in this country. I do not often feel any knotty enlargement of the ligament. Any enlargement I have been able to detect has mostly been of a diffuse nature.

In connection with symptoms and diagnosis he says: "Every strain is accompanied by the usual signs of inflammation, and soon after the injury, swelling, pain, and increased heat of the strained part are discoverable." As I have mentioned already, it depends a good deal upon the nature and position of the lesion how soon after you have swelling or anything like that. The time between its taking place and distinct local evidence being present is very variable. Regarding the diagnosis he says, "The horse's action may be suggestive, but in few cases does action alone warrant the diagnosis of strained tendon." I think we shall all agree with that. He goes on: "Inspection of the lame leg, except in recent bowed tendon may mislead, and a case sometimes occurs in which the exception should be disregarded to avoid error." I must admit that I have read that sentence half a dozen times and I am not very clear what the learned Professor means by it. What is the exception? This expression "bowed tendon" is not one I am familiar with, I expect he means a diffuse enlargement of the tendon whereby it assumes a crooked appearance, a bent or fusiform shape, and perhaps he will tell us later.

Later on he says: "In diagnosing strain just under the knee, the subcarpal, perforans, perforatus, carpal sheath, and the aponeurosis merit consideration." We shall all agree that they all merit consideration, and as I said before unless you get them very soon after the lesion is inflicted it is very difficult sometimes to diagnose the seat of the actual lesion. It does not always make a great deal of difference, but it does make a difference, if you are not in the proper locality. Whether you have the proper tendon or ligament or not, you ought to be in the immediate neighbourhood of it. Sometimes it does not matter which one it is actually if you are over it with the diagnosis.

Later on we have a sentence beginning "Ice poultices and continuous irrigation," and I think the learned Professor would have no compunction whatever in blaming the printer's devil for the lack of commas in that paragraph. At the foot of the same page he says, "Frohner recommends the treatment which he saw employed at the Imperial Stables, Vienna. After the usual preliminary applications to the strained part, the hair is clipped and the skin washed and disinfected, then biniodide of mercury ointment (1 to 4 or 5), is rubbed in thoroughly for 15 minutes, and covered with absorbent cotton and an ordinary bandage, which are allowed to remain in position for two weeks." Now the Professor does not say that he knows anything about this treatment himself. Even Frohner does not say he knows anything about it himself. It is carried from one to another until it is an oft-told tale before it reaches us. I do not know what the Professor does in Camden Town, but I would not like him to blister a well bred horse of mine with 1 to 4 biniodide of mercury. It would take the skin off a bull, even though it were thick enough to make sole leather. How it is kept on, unless by applying the bandage very carefully, I do not know. I can hardly conceive the torture that the animal would have to endure when bandaged in that way. I know that in practice I have once or twice been sufficiently unfortunate to blemish the limb of a well bred horse with biniodide 40 grs. to the oz., 1 to 12. Perhaps they are more easily blistered in our country than in the South, I would not care about applying a blister to a valuable horse, 1 to 4 or 5.

Later on, referring to the chronic condition, a condition that we all know is very difficult to deal with, Prof. Macqueen mentions cauterisation—I would rather he used the word "firing" which he has used later on—as the favourite remedy. He does not give the real reason, or the reason which appeals very strongly to me, in using this as a remedy, namely, that you can apply it and be sure it is done and that the horse gets the advantage of the rest. There are many things you can recommend to ordinary clients, but you go away with no idea whether the treatment will be carried out or not. I must plead guilty to using the cautery when I think other means might be as effectual if I could be sure they would be carried out. It is very much the same thing as applying mustard or other things over the chest, when you might prefer probably hot fomentations, but do not care to order them as you are doubtful whether they will be applied. We must use what we think we can get the most benefit from.

Prof. Macqueen refers to fibrolysin, the new medicament which is going to be of so much benefit to us and to the owners of incurable horses, and he says it may be administered hypodermically, intravenously, or by intra-muscular injection. But why not give it by the mouth, if equally useful in all these ways, perhaps a larger dose will be required? He says immediately afterwards that the cost is not prohibitive, but you must remember it requires from 5 to 50 injections, and you would require a very good client if you were going to give all these injections, to stand all these visits. I am always suspicious of these quack remedies that we know very little about and that require a great deal of dosing. They have to be sold.

Referring to toxic tendinitis or teno-synovitis, I agree with nearly everything the Professor says in connection with that subject. It is a most annoying thing to anyone who is treating an animal. You think you have the horse cured and then you find him go wrong with some of these lamenesses. I am one of those who almost deny that the tendon is primarily affected. In my experience I find that it nearly always begins where you have a synovial base, and I think the flexor sheath is as a rule the first tissue that becomes affected in synovitis.

Prof. Macqueen next refers to complete subcutaneous rupture of perforans, perforatus, or suspensory, and mentions rapid enlargement extending above and below the seat of rupture. As I have said already it depends on the rupture and the amount of vascular tissue that is ruptured. I have made a post-mortem where the perforans was ruptured just immediately after it entered the sesamoid sheath. It was some time before there was any swelling, and six weeks after the lesions before the post-mortem was made. There was not the slightest tendinitis of the perforans tendon. There seemed to be almost atrophy of the ruptured end. There was no enlargement, no swelling, no congestion, no inflammatory appearance about it. So that it depends a good deal upon the amount of blood that is supplied to the part at the time and the extent to which we get the inflammation.

Going on now to the treatment, I want to emphasize what the Professor says when he says, "In most cases slings are useful, if only for a week or two, and when the fetlock is much lowered a surgical shoe should be employed." I question very much, in an old horse, if we had the case early and put it into slings and under favourable conditions, whether we should not have in all cases a favourable termination. All horses will not stand quietly in slings. My belief is that in these cases where you have a very severe lesion with rupture of a tendon, if you can put it up like a fractured limb, put the horse in slings and keep it there, there is a good prospect of having a satisfactory recovery. I remember one case I treated for an injury to the radial ligament which I was unable to diagnose properly. The horse had been treated before I saw it, and there was considerable swelling and enlargement at the back of the knee both above and below. I recommended that the treatment should be continued, hot fomentation, lotions, bandages and so on, with the result that the horse got worse and could hardly put the toe to the ground. I had the animal put into slings and the limb put into plaster of Paris, and the horse is in Edinburgh to-day trotting sound, although that was many years ago.

The Professor refers to wounds and bruises of flexor tendons and classifies them, and I need say nothing about them.

I should just like in conclusion to refer to the remark he makes near the end of the paper that "If granulations interfere with healing, discontinue bandages and apply dried alum, zinc chloride, or weak formalin; or a zinc plate secured by a gauze bandage." I believe they are all good in their way. I like dry better than moist, because you can keep it nearly in position, and it does not affect the healthy skin when it is applied without moisture. My favourite application is powdered sulphate of zinc and pressure; pressure has a wonderful effect upon these things.

I thank Prof. Macqueen for the very excellent paper he has prepared for our enlightenment and I hope I have opened what will prove a good discussion.

Mr. F. L. GOOCH: I should like to thank Prof. Macqueen for the very able paper he has placed before us. Although it is in rather high-flown language I think that is an error on the right side. We in the profession look to take a higher position with the British public, and in that connection I think we should make the best use possible of the English language, and in the present paper I think the Professor has given us very good English, in fact has made his paper not only technically important, but important as a piece of literature. I think it does us good occasionally to go to our medical dictionaries and find out for ourselves words we do not understand, because by that means we acquire the knowledge necessary to combat the learned professors whom Prof. Dewar has been talking about. There is very little, I think, that we can disagree with in Prof. Macqueen's paper. There was one point with which Prof. Dewar disagreed, and I was very much surprised to hear that he did not use more than 1 to 12 iodide of mercury blister. In the district I come from we always use it 1 to 6, and I have not found any ill effects from using it at that strength. At the same time I should certainly not like to carry out the pressure advocated in the quotation given by Prof. Macqueen. I am glad to hear that Prof. Macqueen also goes in for firing, and in fact advocated firing—and deep-seated firing. We are told that in our practice now firing is simply a thing of the past, as it is in the medical profession, and that we only do it now to increase our ledger account. I do not agree with that at all. I am still of opinion that firing, if it is done as the Professor advocated—deep enough, is the best remedy and the quickest remedy for many of the sprains alluded in this paper (Hear, hear). I also quite agree with what the Professor says with regard to puncture firing, where we have bony enlargement or exostosis of the bone and splints, because there is nothing so rapid or so much calculated to give a proper result. I am sure I am very much obliged to Prof. Macqueen for bringing forward this paper. I think it is one that we, as medical practitioners can read and read again, and still find something that we can learn from it. It is a paper that is well calculated to assist us where we have a hunting practice and get so very much of these particular diseases. I cannot quite agree with Prof. Macqueen where he says that a great deal of strain of the subcarpal ligament is found where we have ringbone or a bony enlargement. I believe that we find this sprain to a large extent in hilly districts and in horses that have to take heavy loads up and down hills, more particularly cart horses. I believe that in the city of Birmingham and some other places where there are hills, it is one of the most frequent causes of lameness in the heavy cart horses—sprains in the subcarpal and subtarsal ligaments. I thank Prof. Macqueen again for his able paper.

Col. Steel: Perhaps you will allow me, Sir, to say a few words, particularly with regard to a line of treatment that does not appear to have attracted so much attention as I think I am justified in claiming for it, namely, the mechanical method of treating sprains after the inflammatory stage has passed. To my mind there is a critical time when the commencement of mechanical massage, without the assistance of any drugs whatever, is very beneficial, that stage at which adhesion has commenced, when the adhesions are young, so to speak, and easily broken down. I speak from considerable experience in this matter, because besides frequency of sprains in horses that have been under my charge for many years I have also personal experience in another direction. My brother officers used to laugh at me as being fond of "screws." I was not fond of them—in fact I hated them, but the "screw" price suited me, and I had the opportunity of watching the progress of horses that had met with sprains, and I have been able by general management to keep them going. That explains the fact of the stable, or horse manager's expression, that a horse may under some circumstances work sound, We cannot have a better instance of that than "Rubio," who was employed, after having broken down, in going, as you are aware, from a certain hotel with a 'bus to the station, a gentle exercise every day that gradually broke down the adhesions that had apparently become hopeless. After that he was successful in winning the Grand National last year, and therefore affords an excellent instance of perseverance in simple mechanical treatment without the aid of any drugs whatever. There are many similar instances. I had a horse of my own, bought under circumstances I have described, and by careful treatment I kept him going, and he proved a very useful horse. I got him at a very small price. Another thing I should like to notice is that although these horses may be kept going in this way, they must be judiciously handled or the result will be disappointing. My horse was so fast that I rode him in hunts and he was only cantering when others were galloping. He stood so well that I was encouraged to enter him for a race. I gave him a wind-up gallop, and very fortunately for me he broke down. At the last moment when called upon for his utmost exertion he gave way. With regard to firing, I can confidently say that horses that have been treated in every imaginable way have broken down over and over again, but when fired they have stood—that is my practical experience (Hear, hear). Perhaps I ought to apologise to Professor Macqueen for presuming to give any opinion on matters veterinary. I have the misfortune not to have entered the Service within the last ten years, and during my active life we had not the invaluable assistance of the microscope in diagnosing lameness, so that I was at a great disadvantage, I admit. But perhaps we sometimes awoke from our lethargy. Perhaps if we had had our horses paraded at some distance and looked at them through our telescope we should have had some advantage, and that would have been perfectly consistent with the idleness with which Prof. Macqueen charged our profession. I do not think it was quite kind, I do not think it was quite judicious, and I am sure it was not true.

Mr. R. ROBERTS: I congratulate Professor Macqueen upon the splendid effort he has made for this Association in writing such a brilliant communication. With regard to the toxic condition of the ligaments after an illness, I have frequently seen that, and we were generally taught when I was at College, and it has been fairly maintained in my mind in practice, that those are of a rheumatic order, that they come first in one leg and then in the other, and change about almost with the days, or at least very speedily. If they can be located for a short time and the lameness clearly seen by the swelling, a good blister is the right and correct treatment to apply to those tendons. I have invariably found that it has had the very best effect, better than anything that I have practised. With regard to recent sprains, I do think with Prof. Macqueen that in putting on a good big cotton-wool compress, and binding it very tightly over the sprained tendon one is following out very good treatment, which is often followed by excellent results. Personally I have found it to be very useful indeed. With respect to the term "worn tendons," or "worn ligaments" I have had several such cases in aged horses. I very well remember seeing a few cases in which both legs had become severely sprained at the same time, and I thought that degenerative changes had taken place in those ligaments, and that was really the cause of their rapidly breaking down in both legs at the same time. I have had several similar cases in the course of my practice, and I believe that it is due to degenerative processes going on in the ligaments, causing the breakdown in both limbs. One word with regard to the elasticity of fibrous tissue. With all due deference to Prof. Dewar, I still think with Prof. Macqueen that white fibrous tissue is not elastic, and I believe that is the reason why in a good many cases of injured ligaments of the joints, or inflamed ligaments, we have such great pain, because it is not elastic and will not swell, and thus causes great pressure.

Mr. A. RENFREW (Broadway, Worcs.): Like those who have already spoken, I just wish to add my thanks to Prof. Macqueen for the excellent paper he has written. I think it does very great credit to the writer of the paper when such an old hand as Professor Dewar in analysing the paper had really so very little to say against it.

Prof. DEWAR: I spoke for the full time allotted to me (Laughter).

Mr. RENFREW: I do think when Professor Dewar has to make a distinction between sprain and strain it shows how carefully the paper has been prepared. Coming to the paper itself, Prof. Dewar took exception to the word "chaser." I do not know really on what grounds, because I think the person who did not know what was meant by the term "chaser" in this paper must be a member of the Antigambling League who had never made a bet (Laughter). Perhaps you will allow me to follow more on the track of Prof. Dewar, because I take it that in opening the discussion he picked out the only weak spots, and therefore I too might take advantage of those weak spots. I think Prof. Dewar said that in his experience the time we get strain of tendons is when a horse is tired, very often when the muscles are relaxed. That is the time in my country when I get broken knees. Surely if a muscle is tired and any injury were to result it would be the muscular fibres that would suffer and not the tendons. Again, it was said that we had sprain of the tendon or strain of the subcarpal tendon associated with ring-bone, but I think that can be hardly the case when we are talking about young racehorses and young hunters that have to jump. I quite agree with what Prof. Dewar says in regard to that, that in that case the strain was very often due to the fact that the horse was asked to do something he was not prepared for, and at that moment neither the muscles nor the tendons were strong enough. In my district, which is a hunting one, I get a tremendous number of strains of the subcarpal ligament in horses that are not fit, altogether apart from any ringbone. With reference to elasticity of the tendon, we are all taught at school that there is elasticity in everything; but if we were to ride a horse with legs of iron I am afraid we should not agree with that. In the same way in a horse with an upright fetlock, however elastic the tendons or muscles might be, we should have concussion. If there is really no elasticity, but we have a good angle, we have less concussion so long as the fetlock will stand. I can only offer again my great thanks to Prof. Macqueen for such a very able paper, and I am pleased to say that although I have tried very hard I cannot find anything to complain about.

Mr. Barron (Blandford): I should like to ask Prof. Macqueen a practical question. When one comes to examine a horse for soundness one sometimes finds a tendon swollen all the way down from the top to the bottom, and sometimes one finds a tendon with a swelling simply in one part of it. I should like to know whether I ought to pass that horse. I have passed horses with swollen tendons and they have stood sound. Every practical man as well as myself desires to distinguish between the tendon that will stand and the tendon that will not stand. Is it simply the sheath of the tendon that has swollen? I think myself the sheath of a tendon when it has been inflamed may not cause lameness in the future, but if you get the actual fibres of the tendon lacerated, that tendon will give way again, and I should like a little help from Prof. Macqueen on the point. I was very much amused by, and thoroughly enjoyed, Prof. Dewar's remarks. I think he rather depreciated the intelligence of his audience when he thinks we cannot manage these long words. As a scientific body we ought to be able to tackle any kind of language that occurs in an English dictionary. With regard to blistering, I use biniodide of mercury 1 to 6, rubbing it in for several minutes. I have had biniodide of mercury rubbed into a calf for 20 minutes for the disease we call "crankums" in our district, and it brings off the hide and leaves a blemish. I should not think of using iodide of mercury 1 to 4 and covering it up with anything, because I should expect to see the tendons and bones exposed. I am inclined to agree with Prof. Dewar's remarks about elasticity; I think there must be some elasticity in the tendons.

Mr. J. McGavin (Montgomery): I must thank Prof. Macqueen for his very scientific and able paper, and I think we shall all agree that

that is a description of it. In fact I think Prof. Macqueen has only one fault, namely, that he does not get upon his legs at these meetings quite often enough. We always look forward to a treat when Prof. Macqueen takes anything in hand because he does it so thoroughly. He has dealt in that thorough manner with the paper before us. We may agree or we may disagree. We cannot all be of the same mind at all times ; but taking it altogether it is a grand paper, and we have enjoyed it very much. In the matter of treatment, Prof. Macqueen mentions nothing at all about physic, and I look upon a dose of physic for an animal with a strained tendon, or anything of that kind, as doing a great amount of good ; and after using the physic going on with cold water and other applications. First of all give a dose of physic, then afterwards a little iodide of potassium or mercuric iodide, which is a very good thing to prevent adhesions taking place.

Mr. W. Woods : There are just two or three remarks that perhaps I might make, although I am afraid with regard to one of them I may be somewhat in the position of Prof. Dewar, that is to say, you may discuss my remarks rather than the paper. First of all I wish to say a word as to elasticity. Scientifically speaking, I suppose everything is elastic. There is elasticity in a brick, but not very much. How about the elasticity of the suspensory ligament ? How far does the fetlock joint appear to come down, and how far does it come down when the whole weight of the body is placed upon it ? I suppose not less than from half-an-inch to one inch in many cases. You can take the suspensory ligament after death and you can hang any weight you like upon it, and I defy anyone to extend that ligament for half-an-inch. Therefore you must explain that descent of the fetlock in some other way. It is not due to the elasticity of the white fibrous tissue, unless you are going to contend that white fibrous tissue in the living body acts differently from white fibrous tissue immediately after death. So far as elasticity goes then, I am a believer in its being in no way practically elastic. When foals come down on their fetlocks, they are down not half-an-inch or one inch, but 3 or 4 inches, with their toes up; but in three or four days they will be standing quite straight. Is that elasticity ? I believe it is a relaxation of the muscular tissue, and I think that is the true explanation of it. Regarding sprain, the interesting question is, When does a sprain occur ? I believe with Professor Macqueen that it occurs nearly always when the muscle is tired. Ask yourself when the greatest strain comes on the tendon of the racehorse. You will find it is immediately after the tape goes up ; that is the time the greatest strain is on him, when he makes his plunge. I am not sufficiently acquainted with racehorses to give a dogmatic opinion, but I never saw a racehorse break down in the first 100 yards, as he would do, according to all appearances, if he broke down at the time of the greatest effort on the tendons. He really breaks down at the end of the race, that is to say, he breaks down when his muscles are not acting well together, and are tired, and when, consequently, greater strain is thrown upon the ligaments than when he is not tired. There is one statement in the paper with regard to strained tendons where Professor Macqueen says, "Though sometimes referred to rheumatism, the alteration gradually produced is so painless in its progess and effects that one hesitates to accept this explanation." We all know those cases. They are not due to work. They are horses that are constitutionally unhealthy, horses that lie a great deal, horses that are tucked up in their belly, horses that do not feed well. You find them thickened down both tendons, and they will be that way whether they are worked hard or whether they are not. I do not believe it is a sprain at all. I believe it is a deposit which comes near to gout in the human subject. For want of a better term I should accept it as being as near rheumatism as any term that we can give to it. Those horses, as we know, never do any good. Town horses finish up by being sold at a very low price, to go on to a farm, before they have done very much work at all. There is one little paragraph in the paper that I want to congratulate Prof. Macqueen upon; it is a lovely epigrammatic sentence. In speaking of deep puncture firing for sprained tendon, Prof. Macqueen says "Deep puncture firing is dangerous where a synovial sheath exists, and an operation that may produce open synovitis should not be undertaken without due consideration." I should guess the man who wrote that sentence came from the north of the Tweed, because I think it is a sentence which conveys a great deal more than it says. He might have added that after due deliberation you would probably not do it at all. I am very much astonished to find that no one has made any remarks on the subject of treatment. Prof. Macqueen in dealing with the treatment of sprained sub-carpal ligament says, "Treatment of a recent case comprises rest, which too often is ridiculously short and inadequate; raising the heels, warm fomentations to mitigate pain and so on." Is raising the heel good treatment for a sprained subcarpal ligament? When I was at College we were always taught to rest the part, raise the heels, foment, and afterwards fire and blister. I candidly say I do not think I ever saw one of those cases do well when treated in that way in the fore leg. In nearly every case contraction of the tendon and straining of the leg came about, and then came those ringbones which perhaps may follow sprained tendon sometimes rather then precede them, that Prof. Macqueen refers to.

The question as to whether that was the correct treatment was brought to my mind first of all in connection with an animal that had had a serious sprain of the subcarpal ligament. I was treating it in the approved fashion when it had an attack of laminitis. I thought to myself, Whatever is going to happen now? Here I have a horse that wants to go on his toes with strained subcarpal ligament, and wants to go on his heels with laminitis. He went on his heels. Up to that time I had never seen a strained subcarpal ligament that did so well, and that made me wonder whether high heel treatment was the correct treatment. Since then I have never used high heels in the treatment of a strained check ligament of a fore leg (Hear, hear). My treatment has been pressure by a plaster bandage and a flat shoe. It may be a fad on my part, but I put them to light work, I do not rest them at all;

and after two or three weeks I take off that bandage, and fire, and I believe that is the best way. I have had very much more success with that than I had when I used high heel shoes. I am not going into the scientific explanation of it, though, of course, there is one. I believe that if you raise the heels you give more room to the fibres of those tendons; the ends of the fibres are spread further from each other and you have more cicatricial tissue to contract. But whatever the explanation may be, I am certain that if those people who have adopted the high heel treatment will adopt the other, they will satisfy themselves that they have made an improvement on the original treatment.

The CHAIRMAN: I should very much like to hear Mr. Leach's opinion of this paper, because he is a man who has had considerable experience, and what he says will be of great benefit to us all.

Mr. E. H. LEACH (Newmarket): I do not think I can add much to what has been said. The paper is an excellent one, and I think Prof. Macqueen has pretty well exhausted the whole subject. But there are one or two questions I should like to ask. With regard to strain of the subcarpal ligament, has Prof. Macqueen ever examined the horse above the knee? I am speaking now of racehorses and chasers—cart horses are different. We often find—in fact, I have four or five cases now—that it is not the check ligament at all, but above the knee where they have the injury. The swelling comes down the inside with the flexor tendons, and you get feeling about a third of the way or half the way down the tendons to the middle of the shin, sometimes a little further, but not often. Nine times out of ten it is the injury above the knee in racehorses and thoroughbreds. I am not saying that we do not have the check ligament strained, but I think it is very rare in comparison with the other. There is another thing I should like to know. You often in examining horses find the branch between the two metacarpal nerves thickened, about four times as thick as the normal, and you can roll it under your fingers, and find it is sore. Why is that? Is that a signal that you are going to have a strained tendon—which nearly always follows? I do not know why it should be. If it does not get well you presently find the tendon begin to thicken, and if you keep on working the horse it continually gets worse.

Mr. J. F. SIMPSON: Do you mean the oblique branch?

Mr. LEACH: The connecting branch. I do not know the reason myself, and I should like to know the reason why. Speaking about horses spraining themselves, I think a horse may strain a tendon at any time from exertion, but I do not think he often does it except when he is tired. A horse gets tired and his action gets a little bit afloat, and then he sprains his tendons, generally when he is really tired. You often find horses go through a gallop, and just at the end of it sprain their legs and tendons.

A Member: Tendon or ligament?

Mr. LEACH: Both. That is when you get suspensory strain, when a horse is really tired and his muscles relaxed, and the weight coming on the suspensory. With regard to high heeled shoes, I think it is a mistake in a great many instances, if you have a horse with longish pasterns, to put a high heeled shoe on. You put it on to relax his tendons, but in my opinion you tighten them. Supposing you have a carthorse and you are going to shoe it, and in order to make his pasterns a bit more oblique than they are you put a high heeled shoe on, you drop his fetlock and between the pedal and os coronæ bones you get flexion, and his fetlock comes lower down. You can see that very much if you put a high heeled shoe on the foot: you can watch the fetlock come down.

Mr. A. RENFREW (Broadway, Worc.): I should like to ask that this matter might be cleared up, from a selfish standpoint. I followed what Mr. Woods said, but in his remarks he stated that he had never seen a horse break down at the commencement of a gallop, but invariably or almost invariably when the horse was tired. I should like to ask Mr. Woods, in that case, what he would call a breakdown of the tendons or ligaments. In my experience that breakdown which occurs when a horse is tired is almost invariably a breakdown of the suspensory ligament or the inferior ligament.

Mr. WOODS: I did not really refer to the breakdown of the suspensory ligament, but a strain of any extent in a race has occurred in the second half of the race and not in the first half—lameness of any kind due to a sprain between the knee and the foot. I have not any very great experience of racehorses, but I have watched them and tried to make out where these things do occur.

Dr. WILLIAMS (U.S.A.): I do not know that I can offer anything material to the discussion on this excellent paper of Prof. Macqueen's, which I have not had a good opportunity of studying. It deserves of course a great deal of careful study before one can attempt intelligently to discuss it. There are, however, some points in the paper that bring up some very interesting questions, and questions that deserve a good deal of consideration. In one case, for instance, Prof. Macqueen mentions the subject of a constitutional disease of the tendons—some disease of the tendons due to some constitutional disturbance. Also a question is raised regarding the simultaneous occurrence, or near occurrence, of ring-bone and some disease of the ligaments. In the vicinity where I chance to be engaged in work we very frequently see some disease of the ligaments associated very closely with ring-bone and with other similar diseases of the bones and joints, and the question very frequently arises as to whether the disease of the tendons is due to some constitutional disease primarily, and secondarily to some slight strain; or whether the disease of the tendons is due wholly to some strain. In a great many cases it seems to me we have the two factors at work. First of all there is some disease, which I shall not define, at work in the system of the animal, affecting the bones and tendons in general, weakening them, and then, after some very slight mechanical injury to the tendons we have disease of the tendons developing. There seems to be every degree of that, so that in some cases an animal which is standing simply in a stall develops these diseases of the tendons—toxic diseases of the tendons, I think Prof. Macqueen described it. I do not know how to differentiate between the two, and always tell whether it is really mechanical or whether it is partially mechanical and partially constitutional, or whether it is wholly constitutional. We certainly have the three varieties, as we may term them.

In regard to the treatment of strained tendons, I may say that amongst us we differ somewhat in our plan of treatment, and are more or less rapidly changing our base. Prof. Macqueen said at the outset that one of the first thing is rest. I believe as a general rule veterinarians get too far away from that fundamental proposition in the treatment of any disease, that is to say, rest of the diseased part. That really constitutes the foundation of the treatment to which we should always resort and which we should always keep in sight. Prof. Macqueen, however, has not defined his term "rest," and I presume that if the various members of the Association were asked to define the term there would be a great many different definitions. What constitutes rest? What does Prof. Macqueen mean by rest of the limb or of the patient? It is in the varying interpretation of that term "rest" that we have a great deal of difference in our kind of treatment. Does blistering constitute rest of the tendon? Perhaps in a certain way it does. Does bandaging constitute rest, bandaging with pressure? We should probably say it does. It depends for its efficiency very largely upon the degree of rest which it produces. In other words we are gradually intensifying our definition of the term "rest," and not alone of strained tendons but of some other injuries which may be comparable to it. We carry our rest treatment further than Professor Macqueen has suggested, or than has been mentioned in this room. We absolutely fix, or as nearly as possible fix, the part, and possibly we very frequently rely upon that, and upon that alone, in the handling of strains of the tendons and inflammation of the joints. Our methods of securing that fixation of the part and the method of securing rest prohibit the application of blister, and prohibit the application of the various other remedies which have been suggested, and therefore we rely in a great many cases upon the one thing of rest alone—not rest of the animal necessarily, but rest of the part. For instance, in the tendons of the anterior limb, if a subcarpal ligament is strained, we fix that foot, including the carpus, and keep those parts completely at rest under pressure, and in that way we believe we get better results than by any other treatment. It is, however, as I say, simply an intensification of a proposition of Prof. Macqueen's—the definition of rest. Various suggestions have been made with regard to the cause of ruptured tendons and how they come about. It seems to me that the experience of various men differs, and must differ, because there are many causes of rupture of tendon. It is not all due to mechanical violence. For example, we have various diseases of the bones, softening of the bones by which the tendons pull out and draw a portion of the bone with them, like a fracture of the navicular bone and the pulling of the tendon from the pedal bone, and so on; and I have had occasion to observe a number of cases of rupture of the tendon of the anterior extensor of the pedal bone and the anterior ligament of new-born foals. I do not recall having seen anything in the literature of this country regarding that disease. In one case I had four foals, two born in one year and two born in the following year, on the same farm, constituting the entire foals on the farm for those two years, and all four foals suffered within 24 to 48 hours after birth from complete rupture of the tendons of the extensor pedis on both anterior limbs. All the foals fell forward upon the knees and were unable to stand. Two of them were so weak that they died, but two of them recovered, and one of them is now seven or eight years old and doing work without the tendon or muscle of the anterior leg. There is a great furrow where the extensor pedis muscle should be, and the tendon is tailed down to a point at the bifurcation where the extensor pedis and the pedal bone unite, so that the feet are thrown forward in a flail-like fashion, giving a very awkward and peculiar appearance to the movements of the animal. What that rupture signifies I do not know. I mentioned it merely to suggest that in some cases, at least, we must go beyond mechanical injury to explain the rupture. In these cases the tendon pulls away from the extensor pedis muscle at the point of union and falls down in the sheath of that tendon where it passes over the carpus, and no union is possible.

We also differ somewhat in the treatment of an infected tendon sheath, where the tendon sheath becomes open and infected. We are in the habit of laying that tendon sheath open freely from end to end in order that we may be able thoroughly to disinfect, and we find that our results are far better in that way than those we are able to obtain by the injection of antiseptics into the sheath. With that perfect freedom of opening, so that every part of the sheath is available for disinfection, we find we can more thoroughly disinfect, and that, of course, is the problem of disinfection. There has been something said with regard to the use of the sling in cases of diseased tendons. With our method of fixation of the limb we do not use slings; we prefer to allow the animal to walk about with the diseased part thoroughly fixed so that he cannot injure it or place any material strain upon it.

Mr. G. ELPHICK (Newcastle-on-Tyne): I must first congratulate Prof. Macqueen on his very able paper and also upon the interesting discussion which has taken place upon it. There are not many points I intend to dwell upon, but I would particularly refer to one, and that is with regard to the elasticity of the suspensory ligament. I think I must agree with Mr. Woods when he says there is very little elasticity in the suspensory ligament. I think the rising and falling of the fetlock joint is mainly due to the pastern bones. When you watch a horse closely or follow behind him and notice the movements of the muscles and the contraction and expansion of them, and the relaxation of the flexor tendons, you will all agree that there is little or no elasticity in the suspensory ligament. With regard to sprain of the subcarpal ligament, unfortunately we very seldom see these cases in their earliest stages, and therefore we are placed in a very awkward position with regard to treatment. As a rule, these horses by the time we see them are suffering from contraction of the tendon and are beginning to walk on their toes, and are almost past doing any good to in connection with treatment. I may say that I have found it of the greatest benefit, when these cases are first noticed, to put plain shoes upon them and put them to light work on the farm for six or eight months. Under that treatment they invariably come up sound and keep sound. With reference to the remarks made by Prof. Dewar with regard to the analysis of the different strains of the different tendons, I think it is most difficult for anyone to draw up an analysis, because in different horses and different breeds of horses we get different sprains of the tendons. Again, sprains of joints and tendons are almost like ladies' fashions, they come and go, and no one knows why. At times you will get a run, say, of sprains of hocks; at other times sprained back tendons, and next perhaps will come sprained suspensory ligaments. As I say, they seem to come and go like the fashions of the day, a lot of them coming together and then perhaps you get no more of that kind for years. We all know that in cart horses the sprain of the subcarpal ligament is the most common, and it is the most difficult to cure. The same thing may be said with regard to back tendons, it is very rare indeed that we get sprains of back tendons, though in hunters it is a frequent occurrence. Whether it is due to excessive strain, or to over-reaching in jumping, or anything of that kind, it is most difficult sometimes to say. There is no doubt that strains do most frequently occur when horses are tired. In racehorses I think the pressure is put on mostly in finishing a race, and it is at that time that the horse gives way. Racing men know very well that a horse with a dicky near foreleg frequently gives way on the sound off foreleg—why is that? It is because he has put more strain and exertion on the good leg and, in consequence of the amount of strain that is brought upon it, he gives way on that one in trying to save the other.

I can give one beautiful illustration of parasitic disease of the suspensory ligament. During the recent Yeomanry training of the Northumberland Hussars there was a horse came into camp so exceedingly lame that he could hardly stand, and I diagnosed it as a case of rupture of both suspensory ligaments. A Board was called, and as the horse was practically useless he was shot. To satisfy the curiosity of the Medical Officer we made a careful examination of the suspensory ligament, but it did not strike me at that time to look for parasitic disease. If I had had a photograph taken of that suspensory ligament and the one shown in the paper they would be seen to be identically the same. I have no doubt the probabilities are that this has been overlooked because we never make post-mortem examinations to find out the real cause. I may say that in my 38 years' experience as a qualified veterinary surgeon, the recent case that came before my notice was the first and only one upon which I made a post mortem examination to see the extent of the injury.

With regard to treatment of these strained tendons, I quite agree with what other speakers have said, that firing is most essential and one of the most successful modes of treatment; but I have always made it a common practice in all cases of this kind to give horses gentle exercise, little and often. I find I get a much better result, and the probabilities are that the horse will stand sound afterwards. If you keep a horse standing in a stable with a sprained tendon or ligament it invariably happens that instead of getting better he comes out of the stable a great deal worse at the end of the treatment. It is only by giving gentle exercise frequently that any adhesions that may exist are broken down, or that adhesions are prevented, and consequently we get a very much better result in the treatment.

Reply.

Prof. Macqueen said: I am exceedingly obliged to you, gentlemen, for the very kind reception which you have given my paper. I cannot say that I am altogether highly pleased with the way in which you have discharged your duties as critics; you have been exceedingly lenient, not very precise, and I must say that I could have found a good many points in my paper to which objections could be taken. Now beginning with Prof. Dewar, who had the kindness to open the discussion, he objects first of all to the language in which some parts of the paper are written. Well, I do not agree with the Professor that the paper is not exactly intelligible to a gentleman of his standing, and I do not even admit that there are any phrases in the paper that are not comprehensible to the ordinary veterinary surgeon of the rank and file. (Hear, hear.) I consider that our education has not been altogether neglected, and I have only written the paper in ordinary, every-day English.

Coming to particulars, he objects to my term "strain" and he affects to be able to distinguish between the terms "strain" and "sprain." Is not that finicking? What I complain of in the opener's remarks is that he not only finds fault with my term "strain" and hints that a better term would have been "sprain," but he withholds any reason for the proposed substitution. To my thinking strain is as good a term as sprain. Sprain is the term used largely in the medical profession, but strain has a well-known signification in veterinary literature, and I think it is quite intelligible to even the meanest comprehension. Then he finds fault with the inclusion of the term tendinitis as a part of the composite definition of strain. Notwithstanding his remarks, notwithstanding the explanation which he did not give, I still maintain that you cannot have a strain of a tendon without tendinitis, and tendinitis constitutes the essence of strain. Therefore I included the term in the definition. Passing on, he very good humouredly, for a Scotchman, very good naturedly perhaps, found fault with the term "chasers," and he seemed to identify the term with some peculiar breed of sheep. Well, fortunately I have spent a good many of my days on the Southern side of the Border, and I do not regret my ignorance of the Scotch chaser and my acquaintance with the English chaser. The English "chaser" to my mind is quite an acceptable animal, and I have used the term twice in my paper, and the context should have shown even one of the capacity of Prof. Dewar that "chaser" meant something of the horse breed. I think I need not labour that point any further; it means a steeplechaser, or "chaser" for short. Then he found fault with the statistics. Now I can assure you, gentlemen, that had Prof. Dewar arrived in Harrogate a little sooner, and partaken of the palatable water that is so plentiful about here, he would have seen in the earlier part of this paragraph that I prefaced the remark that statistics should only be received with caution. I gave the only statistics available. I do not believe in statistics, not even in those issued by authorities; but although there is a difference in the results, I put down all the statistics I could get simply for the purpose of assisting anyone who was desirous of testing the statement that perforatus strain is much more common than strain of the perforans.

Prof. Dewar asked what is meant by worn tendons. Well, that is a horsey term, and perhaps it should not have been used, but I think that in London, at least, it is pretty well understood, and I notice that one gentleman seemed to comprehend what was meant by the term, and referred to it in his remarks. A worn tendon, to my thinking, is a tendon which appears rather gummy, rather thicker than it ought to be considering the class of horse. The swelling is more or less diffuse, and the tendon can be only described as distinctly worn, and I think the term is similarly explained when one refers to worn joints, joints which have become rounded and a little more prominent than they should be. That is all that I mean by worn tendons, and I consider that that is not a frequent cause, but an occasional cause of strained tendons.

Then with regard to elasticity. I have given my views with regard to the elasticity of the suspensory, and I also gave the opinion of others who have paid attention to this point. I even went further, and in the illustrations and in some of the text I have followed exactly the views of the present Principal of Alfort, Prof. Barrier, who was a distinguished physiologist many years ago. The apparent elasticity of the suspensory is not due to any stretching of the suspensory or any very marked stretching, it is simply due to the movement of the fetlock and pastern bones. It is not a question that is likely to be disposed of to-day; in fact, while writing this portion of the paper I formed the opinion that, like the long debated question of the elasticity of the foot, the elasticity of the suspensory was quite likely to continue to be a debatable point in the veterinary profession. I do not think it matters very much. It is more interesting, perhaps, than useful, but at the same time those who desire to pursue the matter further will find some assistance in studying the question if they will read closely the few pages I have devoted to the action of the fetlock, which is based upon physiological experiments carried out independently by two very close observers, Barrier, the present Principal of Alfort, and Siedamgrotzky, who is no longer with us. Prof. Dewar said it would be difficult to find muscular tissue in the suspensory ligament. Now it is not at all difficult: I am not able to show it on the spot, because owing to the immersion of the specimens in formalin the muscular tissues of the suspensory is not very conspicuous, but it can be shown by dissection. The muscular tissue of the suspensory is variously distributed, and its position in the ligament is not constant by any means. It may be found in considerable quantity near the upper third, and very often you will find a smaller collection of fasiculi just above the bifurcation, but the presence of muscular fasiculi in the suspensory ligament should not be taken, according to my view, as evidence of elasticity. The presence of muscular fasiculi should be rather regarded as a developmental condition which is inseparable from the suspensory of the horse.

Prof. Dewar found fault also with the term "oscillation" and said that oscillation might not be the best word. To my thinking it is the best word to explain what is meant. I selected the word "oscillate" as meaning exactly what Prof. Dewar took it to mean, that is, the to and fro action of the pastern under movement. When weight falls upon the fetlock, the foot resting upon the ground, the pastern rises and falls, or in other words it moves to and fro—it oscillates, and at a certain stage of this movement the upper extremity of the pastern moves in one direction on the metacarpus and the lower end of the pastern moves on the coffin bone.

A further point was raised by Prof. Dewar, who said that I ignored altogether the joint between the first and second phalanges. I am simply following the lead of the physiologist who explained the action of the fetlock. I may add, however, as the question has been raised, that in estimating the structure of the phalangeal lever, no notice is taken of the motion which may take place between the os suffranginis and the os coronæ. The phalangeal lever now is considered to be represented by the os suffranginis and the os coronæ acting as a single piece, because the movement between the os suffranginis and the os coronæ is extremely limited, so limited in fact as to be practically *nil*, and that is the reason I made no reference to that point.

Passing on further in the paper, the Professor referred to symptoms and diagnosis, and found fault with the sentence, "Inspection of the lame leg except in recent bowed tendon may mislead and a case sometimes occurs in which the exception should be disregarded to avoid error." I understood that that was sufficiently plain. In referring to the symptoms, I considered that inspection of the lame leg, except in recent bowed tendon, which ought to be obvious to the inspector, should not often occur, but even in a case of an apparently bowed tendon, or distended perforatus, swelling may occur at the usual seat of that injury which is not due to strain at all. That is the reason for the exception which I make here. Bowed sinew or bowed tendons I considered was quite well known to the profession.

Then he finds fault with Frohner's treatment of strained tendons. Frohner's treatment may be good or it may be bad —I am not here to support the treatment or even to condemn it. In writing a paper for criticism for the members of the Association, I submitted various ideas regarding treatment, and sometimes these ideas may be informing and sometimes they may be the reverse. At the same time if you do not agree with Frohner's treatment by no means adopt it.

There are other points in the treatment which might have been referred to, and I am sorry that no one has referred to the insufflation of sterilised air. In these days of the treatment of milk fever or toxic mammitis by insufflation, it seems to me an attempt might be made to deal with strained tendons by insufflation of air according to Joly's system.

I only leave Prof. Dewar with reluctance, because he has not given me an opportunity of answering him with regard to making additions. He has found faults but he has not supplied any alternatives, and very often his fault-finding was not very apposite.

With regard to the other speakers, Mr. Gooch has no special objections, but he referred to enlarged pastern and the occurrence of subcarpal strain. Some other speakers have also referred to this point, and taking them together, without mentioning names, I am very pleased indeed that something was said in regard to this matter. I hold most strongly that the so-called enlarged pastern—call it a false ringbone, a knob on the pastern, an ankle bone, or any other name you like—constitutes a most important defect. Sometimes it is called ringbone, but it need not necessarily involve the joint at the time of its discovery. In cart horses working in London and working at a rapid pace it is a frequent contributing cause of strained flexor tendons. How the enlargement of the pastern operates can be explained in more than one way, and I do not pretend to be able to satisfy anyone regarding the operation of this cause, but I suggest—and the suggestion has this support—it is not original, but has been advanced for a long while now on the Continent—that the presence of the enlargement of the pastern interferes with the movement of the joint, interferes with the play of the tendons, and in that way throws a greater strain or stress upon the flexors, and the tendon that most frequently suffers is the perforans or the subcarpal check. It is all very well to talk about strained tendons and causes, but what does experience say—and that is the object really of this paper. I should have been much more gratified if a larger number of members had given their experience of these defects of the tendons ; never mind whether a scientific explanation is forthcoming or not. The main object at these meetings I think is to elucidate causes and treatment, and although one's experience may not be always exact, or exact enough to permit of chapter and verse, I think it is always informing. In my experience of enlarged pastern I have known many horses in which the only defect discoverable was an enlarged pastern, and frequently after an interval of six months, nine months, or a year, and sometimes even as early as three months, some of these horses have returned with strained tendons, and I have come to the conclusion that enlarged pastern is much more dangerous as regards tendons than as regards the pastern itself. Others may have a different experience, but I have had sufficient instances to satisfy me of the connection between enlarged pastern and strained tendon.

I hope I am not wearying you gentlemen, because I should like to refer to one or two further points. Col. Steel referred to massage, and I have also referred to massage, and I thought I had done something in the way of historical justice. It may not be generally known, indeed I think it is not generally known, that the introduction of massage both in human practice and in veterinary practice was due to a veterinarian, and that veterinarian had a very hard fight indeed; in fact I may say that Girard, the introducer, died without receiving the proper reward for his original idea. I quite agree with Col. Steel that massage is a beneficial application in many cases of strained tendons. I have particularised the mode of its application as based upon the teaching of Waldteufel, but whether it is always applicable or not I do not say. Then he spoke of mechanical treatment, and instanced the case of a recent winner of the Grand National, Rubio. A good deal of course could be said regarding the legs of horses such as Rubio. Although this horse was well known to have run in a cab between the station and the hotel, and eventually did win the Grand National, the condition of the leg requires a great deal of consideration. As a matter of fact, at the next attempt the horse did not stand the test. Col. Steel introduced into the discussion an item which does not belong to my paper, but I will do that Department of the profession of which Col. Steel is a distinguished ornament, the justice of saying that in my after dinner remarks in London on the spur of the moment I probably took too large a view of the Army Veterinary Service. There are several distinguished exceptions in that Service; both old and young, and I look upon Col. Steel as one of the most remarkable. (Cheers.) Therefore he must not think that an after dinner utterance is to be taken with the same seriousness as a legal indictment.

Mr. Roberts is generally favourable, and to him I owe the explanation of worn tendons. He also favours compression treatment for recent strains.

Mr. Renfrew finds no fault with the paper, and Mr. Barron asked a question relating to practice. There is no objection to answering a question, but I should have preferred Mr. Barron to have brought the horse. He asked what one should do on going to examine a horse as to soundness and finding the flexor tendons swollen all over, not a distinct limited distension, but a diffused swelling over the tendon, and he asked whether it was the sheath or the tendon. In these cases I think it is always the aponeurosis which is involved, and although one may suggest the purchase of a horse with a diffused swelling over the flexor tendons, I should, for my own peace of mind, be inclined to have some sort of option in case the swelling did not disappear. I certainly should not advise any client to purchase outright a horse with a diffused swelling over the flexor tendon, because I hold the view that many cases of strained tendons begin as an inflammation of the fibrous tissue surrounding the tendons, and although a horse may work for a long while satisfactorily with this condition very apparent, the time will come probably when the tendons will be involved, and therefore I should advise Mr. Barron, or any other gentleman who is anxious to have advice upon this point, to do as the late Benjamin Cartledge of Sheffield used to do in making his examination, and giving an opinion—provide a back door for himself.

Mr. McGavin thought favourably of the paper, and introduced the point of giving physic in cases of strain. That may be very useful—or it may not.

Mr. Woods disposed of the question of elasticity. I quite agree with him, and I am very much obliged to him for his support. He agrees also that tired muscles are the cause of strain ; I think that is indisputable. Then he objects to raising the heels. Well, I have no definite opinion regarding the action of raised heels. Sometimes I treat a horse with strained perforans by means of a high heeled shoe and sometimes I do not. I believe that this part of the treatment is based upon the belief—whether well founded or not I am not able to say at the moment—that by raising the heels slightly in a case of subcarpal or perforans strain the tendon is eased, its tension is diminished, and recovery or the reparative process is promoted by the condition of slight relaxation which is produced by the raised heel. Perforatus strain, on the other hand, is not likely to be benefitted by a raised heel, and the explanation is that the elevation of the heel in perforatus strain causes slight flexion of the pastern, and that increases the tension on the perforatus tendon. These are points of detail, and I quite agree with one of the speakers who follows the practice in many cases of turning a horse out. I have known many excellent recoveries follow this method, but in all these cases where a satisfactory recovery has followed turning out the horse shod with a plain shoe the strain has not been a severe one. There are various degrees of strain, as you are well aware, and if you will take the trouble, after the meeting, to look at some of these specimens I think you will agree that they were not likely to be benefitted by turning a horse out with a low heel shoe or without a shoe. That treatment of course is useful enough in its place, but it is not of universal application.

Then Mr. Leach asked a question regarding swelling that appears above the knee and gradually descends towards the fetlock. He is not sure himself of what is the cause of this swelling. That coming from Mr. Leach is rather important, because Mr. Leach is not in the habit of giving up a case without knowing what is the matter with it, and when he says he is not quite sure what is amiss, I am afraid I I cannot help him very much without seeing the horse, and then I might not be of much assistance. But I would suggest that this swelling may be due to strain of the radial ligament, which has recently come into prominence in questions relating to strain. It may, however, be a case of high perforatus strain involving the perforatus immediately below its junction with the muscle. Then he referred to another point, a swelling over the anastomotic branch, between the two metacarpal nerves. That is a very suggestive point. In practice you will sometimes see an oblique swelling immediately behind the tendons corresponding to the direction of the anastomotic branch. That branch is sometimes accompanied by a small vessel, and when a horse perhaps carelessly bandaged is struck without cutting the skin, and the toe of the hind foot strikes that particular part, there is sometimes produced a swelling which looks very much like a strain. Mr. Leach is quite right, that if you have a swelling over the posterior line of the perforatus corresponding to the position of the anastomotic branch between the two metacarpal nerves, it may be the forerunner of a strained tendon, and the tendon that is most likely to suffer will be the perforatus. I am exceedingly obliged to Mr. Leach for intimating that fact because it adds something to our knowledge regarding strain. Mr. Leach also agrees that horses are generally tired when the strain occurs, and he objects to the high-heeled shoe.

Prof. Williams, whom I am pleased to welcome from the United States, represents the Veterinary Department of Cornell, a very distinguished University of the United States. Prof. Williams asks what is meant by rest. I mean by rest, of course, rest of the horse and rest of the limb, that is to say the injured part. I am strongly in favour of resting the part as much as possible. I believe even in going so far as to fix the fetlock, resting the part by fixing the fetlock by means of a plaster band. Prof. Williams also referred to rupture of the extensor pedis tendon, and although I am not dealing with extensor tendons I should like to add a little bit of information in support of Professor Williams' remarks. A filly that gained the first prize in her class at a recent Shire Show, during her foalhood stood for three months in plaster bandages because of a double rupture of the extensor pedis tendon. There is no satisfactory explanation of the origin, but when found she stood doubled over on her fetlocks. As she was a valuable foal for the purpose of breeding she was placed in plaster of Paris bandages which she wore for three months. The pasterns and fetlocks were enormously thickened, and eventually the parts were blistered and other treatment was applied, and she appeared, as I say, at the Shire Show and obtained the first prize in her class; I am not quite sure that she did not obtain the Championship. I do not know whether Mr. Gooch noticed this particular mare; she had a very strong growth of hair over the fetlocks and for a few inches above. I think the case ought to be recorded. It was in charge of Mr. Davis, of Enfield, a member of our profession.

Mr. Elphick agrees with Mr. Woods regarding elasticity, and he also mentioned that there were various strains. He believes that firing is most essential, and advises gentle exercise. Again, of course it is impossible to say much about this advice. A great deal depends upon the degree of strain and its position.

That is all I have to say, gentlemen, but in conclusion I should like to observe that I am much indebted to you for your patience in listening to my explanation. Although I have not been able to make anything in the form of an addendum to my remarks, I have endeavoured to redirect your attention to the pages of the paper which contain a good deal of information, not original, of course, but useful regarding the explanation of certain features of strained tendons.

[The meeting then adjourned for luncheon.]

OUR HORSE SUPPLY.

By Lt.-Col. A. F. Appleton, A.V.C.

Mr. President and Gentlemen,—I feel that I must start my paper by apologising for ever undertaking to write one on such an important subject with my limited experience, and the short time at my disposal to collect facts and statistics. There is no doubt that in looking to the future, the question of our horse supply is a very serious one indeed. Horse breeding has undoubtedly declined in England of late years, and the reasons are, I think, not far to seek.

In the first place, farmers are not as prosperous as they were 30 years ago; at that time most well to do farmers bred hunters, and hunted regularly, while their sons joined the yeomanry and brought their own horses. Now one meets a very limited number of this class in the hunting field, and the yeomanry in most parts of the country consists principally of clerks, various city men, miners, and a small proportion of yeomen. Only last month the Colonel of a Yeomanry Regiment told me that when he joined the regiment each man brought his own horse, but that now only 10 per cent. did so. We may take it then, that the average farmer no longer breeds this class of horse.

Secondly, the competition of motor cars and mechanical transport has given a serious check to horse-breeding, not so much from the falling off in the demand for horses, but from the uncertainty of the future.

There is no doubt that mechanical means of locomotion has to a very great extent replaced the common bred £20 to £30 horse, but I doubt very much if it has replaced to any great extent the better class of horse. Take the hunter for instance, excluding the farmer class, there are undoubtedly more hunting men now than there ever have been, and the price of a good hunter has never been so high as it is now, in fact everything points to the demand being already greater than the supply. The same may be said of all high class horses as regards prices. Many people anticipated that the lighter bred carriage horse was doomed by the motor car, yet I am informed that at the present moment London carriage builders have more demands for light victorias than they can possibly supply; probably ladies are realising that motors do not show them off to the best advantage. The motor scare therefore that did so much harm to horse-breeding was quite unjustified.

Thirdly, I think that although the South African war put a lot of money into the breeders' pockets, the prices offered tempted them to part with many useful mares that would otherwise have been retained for breeding purposes, and which have since been difficult to replace. One reason that I have frequently heard given for the decline of horse-breeding in this country is, that so many of our best mares are purchased by foreigners. This undoubtedly is so, but whether it injures our horse-breeding or not is another question; if the foreigner can give better prices than we can, so much the better for the breeder. If the breeder wants protecting against himself, then by all means put an export tax on mares, but let the proceeds be used for the benefit of horse-breeding. If the tax stops the exportation, then the breeder loses a good customer, if it does not, then the country must benefit.

As the hunter is getting scarce, so is the troop horse, and the trade is practically all in the hands of dealers. A few years ago farmers petitioned government to buy direct from them, and do away with the middle man. They complained that dealers gave them £25 pounds for horses which were immediately purchased for troopers at £40. What was the result? Remount officers visited farms all over the country, but in the great majority of cases were shown only common underbred hackneys and cart horses, a class quite unsuitable for army purposes. Any suitable horses that they came across either the dealer had a lien on, or they were beyond army prices. Large bills for travelling expenses were incurred, but very few horses purchased. The system of collecting horses in centres for the remount officer to see also failed; the dealer had evidently made his selection first. The only conclusion one can come to is that the farmer cannot afford to keep his young stock until they are 4 years old, and has to fall back on the dealer for ready cash; the latter naturally advances money on the most marketable animals, and eventually gets them at a price that cannot possibly leave the farmer any profit. It would be of enormous assistance to breeders if they could sell at 3 years old instead of 4; but as far as remounts are concerned, the cost of keeping them for a year with all the attendant risks, and upkeep of a large establishment, would raise the price as a 4 year old from £40 to something nearer £60.

There is no doubt that the breeder must breed for the market. He must specialise, and breed the best class of the type he selects, be they thorobreds, hunters, hackneys, shires or polo ponies. He has got too much into the habit of breeding from what he has got, and not what we want. There is no room for the nondescript horse in these days. They are not even a necessity on the farm, for where the land is light the hunter class are quite able to do all the work required, and where heavy, so is the shire horse. As far as I have been able to ascertain there is no falling off in the supply of well bred heavy horses, and prices are good; it is with the hunter class that the falling off is taking place, and where our chief anxiety is for the future. And the question of the moment is, how are we going to get the breeder, particularly the small breeder to take them up again? To be successful he must be a good judge of this class of horse, have a suitable farm, and a certain amount of capital. It is not every man that is a good judge of a hunter, but those that are not, and even those that are, can always obtain valuable advice and assistance from those two splendid societies, the Hunters Improvement, and Brood Mare. As regards the farm, the principal requirements are light soil, good grazing and water supply; on such land the stock are able to do all or most of the farm work and pay for their keep.

The "certain amount of capital" is the present day stumbling block, for there is no doubt the average farmer has not got it. How is he to get over this difficulty? Assistance in some form or another must come from Government if the supply of remounts is to be maintained, and all sorts of suggestions have been brought forward as to the manner in which this assistance should be given. One is that an export duty should be put on mares, the proceeds to be used in purchasing stallions to be placed at various centres in suitable parts of the country for free use of approved mares.

A second is to place Government stallions at the kennels in charge of masters of hounds in those parts of the country suitable for the breeding of the hunter class, to cover approved mares free of charge. The Government to give a £5 premium to every mare when the foal is born and have the option of purchasing it as a four-year-old for a further sum of £35, or if suitable for a charger, £45. The breeder, if he considers his horse of greater value than this, to have the option of purchasing it from the Government for £25.

A third is to supply stallions as above, the funds to be raised by an export duty on mares. To advance £5 on every foal born, and another £5 on the second and third years, provided the foal remains suitable, and a balance of £25 to complete the purchase on completion of the fourth year. The breeder always to have the option of returning the money advanced and paying £20 for the use of the stallion. The breeder to take all risks in matters of soundness, and the Government as regards suitability.

These schemes are very imperfect, but I think worthy of discussion.

Surely the time has arrived for the whole question of our horse supply to be taken up in a thoroughly practical manner by Government.

I am aware that a census of country horses has been taken, but why the country and not the towns? Surely we shall get as useful information from a town census as a country one, and one is very incomplete without the other. It cannot be because the town one is difficult to obtain, for I have before me now not only the horse census but also a list of mechanical transport of the city of Hull, with the owners names and addresses. This was compiled for me in about a week by the chief constable of that city for military purposes, and I have no doubt that the chief constables of Bradford, Leeds, Manchester, and any other big towns could do the same.

I learn from this census that the horse population of the City of Hull is 2150. I have now only to ascertain from the various knackers the number of horses killed or disposed of by them during the year, to be able to make a pretty correct estimate of the yearly wastage and requirements of that city. Such a census may indeed be made practical use of in many ways.

I am afraid that since our South African experience, too much reliance is being placed on the importation of foreign horses to supply us in our hour of need, but such favourable conditions are not likely to occur again, and it is quite time we put our house in order.

The PRESIDENT: I am sure you have all read Col. Appleton's paper, but I am extremely sorry to tell you that he has telegraphed to us that he is unable to be here to-day.

DISCUSSION.

Mr. R. BRYDON: In the first place I must thank you, or thank those responsible for the management of the National Association, for having asked me to open the discussion. I may say at once that it is an honour I do not deserve, and one which might have been conferred upon some of your members who would have done it with much greater distinction than I can do it. However, I will do the best I can, and if it only opens up the subject so that you can discuss it fully I take it that that is all you want. I have read Col. Appleton's paper and while there is much in it that I agree with, there is also much on which I take an entirely different view. If you will allow me I will just go through the paper and speak about it in detail.

In the second paragraph he says, "In the first place, farmers are not as prosperous as they were thirty years ago; at that time most well-to-do farmers bred hunters, and hunted regularly, while their sons joined the yeomanry and brought their own horses." Then he goes on to say that very few of that class are now met with in the hunting field, and that most of the yeomanry have to be provided with horses. It is perfectly true that farmers are not perhaps so prosperous as they were in the seventies. At that time wheat was ranging from 50/- to 80/- per quarter, and they did not breed horses then because it was a paying pursuit, but because they could afford to do so, and if they brought up a horse and got some hunting out of it, and they kept on breeding a few, it was not so much because it was a paying concern, as because it gave them an interest in their work, and as other things were profitable they were quite able to do that.

He goes on to say, "One reason that I have frequently heard given for the decline of horse-breeding in this country is, that so many of our best mares are purchased by foreigners. This undoubtedly is so, but whether it injures our horse-breeding or not is another question; if the foreigner can give better prices than we can, so much the better for the breeder. If the breeder wants protecting against himself, then by all means put an export tax on mares, but let the proceeds be used for the benefit of horse-breeding." Now to begin with, whatever the cause may be I am certain it is not the scarcity of mares. There are plenty of good mares in the country and if it were worth while to breed remounts, which I must say it is not at the price they get for them, plenty of remounts would be produced. If by any means a profitable market could be ensured the remounts would be forthcoming, and we would not need to go out of the country to seek the markets or seek the capital or anything else. The farmers would very quickly cater for the market if the market was there. Then again he refers to an export tax on mares, and I entirely disagree with that; I do not think that would do any good at all. He goes on to say "A few years ago farmers petitioned Government to buy direct from them, and do away with the middle man." I think if that could be done it would be of considerable advantage, but it seems to me it would be very difficult to organise unless there was some agent appointed in each district on behalf of the Government to look after the horses in that district. Then perhaps something might be done in that way.

Later on in the paper he says, "The 'certain amount of capital' is the present day stumbling block, for there is no doubt the average farmer has not got it. How is he to get over this difficulty? Assistance in some form or another must come from Government if the supply of remounts is to be maintained, and all sorts of suggestions have been brought forward as to the manner in which this assistance should be given. One is that an export duty should be put on mares, the proceeds to be used in purchasing stallions to be placed at various centres in suitable parts of the country for free use of approved mares." Now, gentlemen, I think there is something in what he says about stallions being placed in various parts of the country. I am quite certain that we have not sufficient stallions within the reach of farmers. The Italian system I believe is a very good one. There the Government have large depots of stallions of all kinds, and these they keep all together in these depots during the winter season, and later on when the covering season comes on these horses are sent out to certain centres in every horse-breeding district of the country, so that practically all the breeders in Italy are within reach of the Government stallions. Col. Appleton goes on to say; "A second plan is to place Government stallions at the kennels in charge of masters of hounds in those parts of the country suitable for the breeding of the hunter class, to cover approved mares free of charge. The Government to give a £5 premium to every mare when the foal is born and have the option of purchasing it as a four-year-old for a further sum of £35, or if suitable for a charger, £45. The breeder, if he considers his horse of greater value than this, to have the option of purchasing it from the Government for £25. "Personally I entirely disagree with all that. I do not think it would do the slightest good to give doles of that kind to tenant farmers. (Hear, hear.) It would only pauperise them in a manner, and the class of men that would receive doles of that kind are not the men that would go into horse-breeding to make it a successful venture. (Hear, hear.) He continues: "A third is to supply stallions as above, the funds to be raised by an export duty on mares.

To advance £5 on every foal born, and another £5 on the second and third years, provided the foal remains suitable, and a balance of £25 to complete the purchase on completion of the fourth year. The breeder always to have the option of returning the money advanced and paying £20 for the use of the stallion. The breeder to take all risks in matters of soundness, and the Government as regards suitability." I think that also is a very clumsy suggestion, and one that would not meet the object in view. The real fact of the matter is that it will not pay any man living, I do not care how careful he is, to breed horses and sell them to the Government at four years old at £40.

How can he do it? If you look at it for a moment, supposing a farmer has a mare and he uses that mare for going to Kirk and market, and for doing light jobs about the place, and he puts her to a Government stallion, it will cost him about two guineas, or £2 5 0 with the groom's fee. Then for about six months, two months before she foals and four months afterwards, he would not have any use of that mare at all, or a very limited use, and the loss to him on that account would be something like £5 for six months. By that time the foal may be four months old and he would have that foal to keep another eight months before it was a yearling. As everyone connected with horses knows, the first year is the most expensive of all. If a youngster is not fed well with corn and hay and roots and carefully looked after during the first year it loses its growth and never recovers it. To keep that foal decently for eight months would cost at least £8, £1 a month. After that there is another three years in which he has to be kept, and I think the least he could put down for keeping that horse for three years would be £9 a year, which would be £27 for three years, with the £8 and the £4 and the £2 that would make altogether, £41 something like £41 as the bare cost without taking into consideration incidentals for breaking and shoeing and other things. For that expenditure of £41 the Government very generously offer £40 if they like the horse, and if they do not like it—well, they do not like it. All these doles which are foreshadowed in this paper, even if they got them all and the Government liked the horse at the finish, would only amount to £40 after all. You may take it from me and from anyone who has considered the subject that there are no men who can breed horses commercially and make the business pay in this country if they are only to get £40 for them at four years old. If the Government would take them at three years old and give £40, the case would be vastly improved; there would be a little profit—not very much, but still a little. If they were then sent into a depot and trained for a year they would get them in the end at something like £50 or £60. I think they would be better in the hands of the Government for the last year rather than being left with the farmer; they would get better training and be more carefully looked after, and there is no doubt that they would be more ready for their work by the time they were wanted.

Now contrast for a moment the difference between breeding these remounts and breeding ordinary heavy horses. I have had a good deal to do with breeding Clydesdales and other horses, and I find we have had sales of foals every year for the last twenty years. The other night I was looking over the accounts, and I looked up the average price that the foals realised when they were between three and four months old, and I found that the lowest average price was £35 and the highest average price was £50—that is for animals three and four months old. If people can do that, and have no difficulty in doing it, is it likely they would begin to breed remounts, run all the risk, and get £40 when the animals are four years old?

Col. Appleton says that a census ought to be taken of the town horses, and I certainly think that would be most useful. I said at the beginning that there was no scarcity of mares in the country, and that I think you will find to be perfectly accurate. Sir Walter Gilbey a few years ago took a great deal of trouble in getting statistics about the number of mares that were in the country, and he found out there were any amount of mares, and that the foreigners, although they are blamed for buying all the best mares and taking them away, as an actual fact did not buy 5 per cent. of the mares available for breeding purposes. If people would breed from their mares, the mares that were useful for the purpose, selling 5 per cent. abroad would not at all interfere with the matter. It has often struck me that the Government ought to have some regiments mounted with undersized horses, between 14·2 and 15 hands, or even 14 and 15 hands. I think our experience in the South African War brought out very clearly how very valuable that class of horse was in the conduct of a campaign such as had to be conducted in South Africa. These animals stood their work far better than the bigger horses; secondly, they could be kept at very much less cost; and thirdly, they cost very much less to begin with. I think there should be a few regiments horsed with animals of that size on which the lighter men could be mounted. I am certain that that would relieve the situation very greatly.

I may say that I put down some notes on a paper of things that I wanted to talk to you about, but unfortunately I have either left them at the hotel or I have lost them on the way. I did not know I had not got them until I came into the room. Under those circumstances I am certain I have forgotten to say many things I wanted to say, but I hope I have said sufficient to enable others who are far more capable than I am to carry on the discussion.

The President: We shall be very pleased to hear anyone who comes from a breeding country. There are two or three gentlemen here from Ireland, Mr. Howard being one, and we should like to hear a few words from him.

Mr. P. J. Howard: I am sorry that Col. Appleton is not present, because I do not think I for one could congratulate him on his effort to supply a paper for such an important congress as this on such a very important subject as the horse supply all over the country for the Army. In connection with his masters, the British Government, he is treating the matter to say the least of it not very respectably or respectfully.

He dismisses the whole subject in about three pages and in those three pages I do not know whether they are his own opinions or the opinions of the Army authorities he is giving on the matter, but some of them are very, very weak, and I am surprised that a man who is a veterinary surgeon—as a rule they are sensible men, you know—attempting to lay down in print some of the things he has put down here.

On page 80 he says "At one time there was a competition amongst the farmers of this country to get the Government to buy their horses direct from the farmers or the breeders." I believe that competition was some years ago. This gentleman says the result of it was that remount officers visited farms and in a great many cases they were only shown the underbred hackneys and cart horses. He does not tell us what they were shown in other cases, but I may tell you because I know a little about it. Some of those men were sent to places where they were shown the very articles they required, and they knew so much about what they wanted that they went away without buying them; in fact, I can relate one case in my own county where the remount officer came and saw 20 colts and fillies, four-year-olds, and out of the 20 he was satisfied to take three. Within a week a dealer came along and bought the other 17, and within a month those same remount people took 16 out of the 17 from the dealer (Laughter). Now, gentlemen, I think that is a fairly good proof of the competency and the ability of the men that were sent out to select horses for purchase in the first instance. As I said, they knew so much about what they were sent to do that they did not do it at all. The essayist has given us—as I say, perhaps I am accusing him wrongly, as they may not be his own ideas, but the ideas of somebody else—he has given us as a cure for the ills from which we suffer, that is to say, the want of horse-breeding at the present time, the suggestion that we are to put a tax on the mares that are exported. It would be a very sorry state of things for the breeders, at least in my country, if we had not the foreign Governments to come and buy our horses (Hear, hear). I am very sure that so far as our country is concerned they would never agree to a tax being put on animals that are to be exported (Hear, hear.) What we want to do in our country is to encourage anybody who will come along and give a proper value for our horses, and if the British Government is not satisfied to do it, it is a very lucky job we have someone else to deal with. Another suggestion is that there should be a £5 premium paid when a foal is born and that the Government should have the option of buying it when it is four years old for the sum of £35, or if it happened to be suitable for a charger they might give £45. Well, I wonder whether this gentleman has ever lived on a farm or whether anybody belonging to him ever bred horses. If so, he must be a philanthropist of the highest order. I may tell you that even in Ireland, where we do things sometimes on an economical scale, we can hardly produce them as four-year-olds at £40. Although we might be very satisfied to subscribe to Dreadnoughts and the rest of the things they require for guarding the shores of this important country of ours, we can hardly afford to produce animals that cost us about £45 or £50 and hand them over to the Government at £35 or, if they are good enough to be chargers, at £45. Before I leave his suggestions I should like to refer to one other thing. He speaks of giving £5 a year on the foal and the balance of the price, £25, on the completion of the purchase, or if the farmer thinks the horse is worth more he should pay back the money to the Government or £20 for the use of the stallion. If the farmers in England would be satisfied to do that, I am afraid the farmers on our side of the Channel would not. I know what they get they like to stick to. If they managed to get hold of this little subscription of a fiver, I am sure the Government would not be likely to get it back again (Laughter). I really think the only solution of the matter would be that the Government should be impressed with the necessity of paying a decent price for three-year-olds. Last night we were discussing the work of the National Veterinary Association, and surely to goodness the National Veterinary Association ought to be the body whose voice should be listened to in a matter of this kind. They ought to know something about the whole management of breeding horses. Some men belonging to the Army give it as their opinion from time to time that horses are not fit to be bought as three-year-olds for the Army, but they must know very little about what they are talking. If it is good enough for foreign Governments to buy three-year-olds, there must be some unexplainable reason why they are not good enough for the Home Government. If we take the general state of affairs with regard to the competency of our Home Government and their horsemen, and compare the feats of the representatives of foreign Governments with the representatives of our own at the Olympia Show the other day, I really think that we do not come out on top. The trouble is that if our Government will not feed their three-year-olds when they get them they of course will be no good to them. That is the real crux. The three year old horse is not fed—he is starved. If they want to find a practical solution of this very important question our Government should be advised—and I see nobody more capable of advising them than this National Veterinary Association—and I do hope that from this meeting some resolution will go forth and be sent to the authorities to act upon, to the effect that they be encouraged to buy three-year-olds and then have them properly fed and trained. From a knowledge of horses gained in a lifetime spent among them, I am bound to say I think the well-fed three-year-old is capable of standing the ordinary training that will be given for army purposes. He need not have very hard work to do. He will be a well fed, properly trained animal at four years old, and during his three year old career he would be very well able to fulfil all the requirements of parade and show that most of the animals are used for at the present time in this country (Hear, hear). There is nothing more I can say, except that I am awfully sorry the gentleman who produced *this*—well, I do not mean the printer—is not here to defend himself and those he represents in regard to this very, very important question of our horse supply.

Mr. J. CAMERON: I am very sorry that I cannot give you any information on this subject. There are many items which appear in the papers that one misses and perhaps I may have missed a little knowledge. At the present moment I am not sure whether we are discussing a reality or a supposition. I am not sure whether the author of this paper wishes us to follow him or not. The item of knowledge I am deficient in is: Does the present Government admit that they have any difficulty in obtaining the number and quality of horses which they think is necessary nowadays for the Army? That is the first thing to be considered, because our Imperial Forces have different ideas nowadays from what they had once upon a time. Having regard to the quantity of motor cars that are being used, does the Government actually say there are difficulties in the supply of horses? ("Yes, they do, most emphatically.") Very well, then, let them do something to remedy the matter.

Col. STEEL: I am afraid I have not a sufficiently wide knowledge of the subject of this paper to give you any opinion, even if I were competent to do so. I have not been connected with the purchase of horses for the Army for some years now, but I recollect very well the conditions under which they were purchased years ago. One thing has struck me with regard to that interesting story given by my friend Mr. Howard, of the mistake made by the purchasing agents and their buying the same horses afterwards from a dealer. That is explicable, for I really think, with all due respect to my own profession as connected with the Army, that they cannot be so qualified to purchase a horse as a dealer is. In my day the dealer used to purchase the horse and was so correct in his estimate of what was required that they usually required but very little selection.

With regard to the price that horses can be purchased at, I think we have abundant evidence that it is not a paying price. Various schemes have been proposed, and I think I am right in saying not fully carried out, for the Government purchase of young horses. I know from extensive experience and observation that that would not answer. They have established breeding centres in India, and the experiments were conducted for some years with so much loss that they were obliged at last to abandon them. Next they tried the method of buying horses and keeping them until they had developed and become suitable for army purposes, and then they were selected for the different branches of the service. I entered into an estimate of the expense of attending these horse at a remount depot, as it was called, at a place called Saranpur, in order to show how utterly hopeless it is to establish anything in that way under the auspices of Government. A very eminent veterinarian in India, Kettlewell, and I, during the hot weather of one year, amused ourselves in estimating the cost of horses after they had gone through this depot and reached their regiments. We started with an initial cost of 500 rupees at Calcutta for Walers. They came over as three or four-year-olds and they cost 100 rupees each to convey several hundred miles to this depot. When at the depot they were not even trained, and a number of accidents would naturally occur as the result of sickness, etc. The farm on which they were kept was hired by the Government. There was a Commandant very highly paid, an assistant Commandant, similarly remunerated, and a veterinary surgeon who got a very large salary indeed! Every division of this depot had a European superintendent who was paid very well for his rank in the Service, a sergeant or non-commissioned officer of some sort. Then there were all the syces or native grooms which although individually paid a very small sum, collectively it amounted to a great deal. That will just give you an idea of the expense of such establishments under Government management. The result of our estimate was that every horse when he joined the Service cost 1,700 rupees. At that time the rupee was at par, and that meant £170 per horse. If the Government can afford to waste money in that way, I think if they were to raise the price of troopers to something between £60 and £100 it would be economical. I really think the Government ought to be urged strenuously to raise the price of troopers, and then take such means for protection from imposition as may be necessary (Hear, hear). I do not think it depends so much on the selection made by the remount agents, as on the business management. The Government ought to pay more. They are attempting now a system in Ireland—Mr. Howard will correct me if I make a mistake—of introducing stallions to serve premium mares at a small price.

Mr. HOWARD: At two guineas.

Col. STEEL: And so encourage the breed of horse we require. I know with regard to the mares that it would be necessary to have some supervision to see that they should be approved mares, because the belief of the Irish farmer, especially the small farmer, is that any mare is good enough for breeding purposes if she is useful for other purposes. They lose sight of the fact of the mare being of the quality. The only solution that appears to me is to raise the price and make it worth while breeding a proper animal, giving as much Government assistance as is possible in order to secure remounts.

Mr. HOWARD: With your permission, sir, I want just to correct what appears to me to be a mistake that has crept into Col. Steel's mind about something I said with reference to the little incident of the purchase of horses. I did not at all wish to attach any blame to the veterinary representative. Unfortunately, the veterinary officer, until quite recently, had no say whatever in the purchase. He was the man who knew or should know something on the subject, but he had to stand behind and allow a man who very often knew nothing whatever about the thing to assume the whole control. The veterinary surgeon was simply there to examine, and until they were bought he dared not have any say whatever.

Major A. W. MASON: The only remarks I have to make are somewhat on the same lines as those of the last speakers. The British Government make a mistake in not giving a sufficient price for their animals. The opener of this discussion has gone more deeply into the subject than I have, and he has given you facts which I can really confirm. As a matter of fact the breeder has practically turned the animal over to the Government, and in a sense he is out of pocket. I do not consider that the farmer should be a patriot only; he has to live the same as we have, and he must get a reasonable profit. If the British Army is to be horsed, a respectable or decent figure must be given for a suitable animal for the purpose. In my opinion they are not horsed to-day as they were in my time. They are under-sized, under-bred animals, such as might be described as nondescripts, having neither stamina nor breed. Col. Steel has told you the cost in India when worked out in figures, and it is practically the same in this country. If they would only buy animals a year younger and bring them up to the standard they require, in a year's time, with the small amount of work necessary to train them, they would have suitable animals and a better breed of animal. I quite agree with the last speaker who mentioned the position of the veterinary officer. I can speak very advisedly of the matter in connection with the late war. I was called back again to be the veterinary officer attached to a remount officer, but I had no say in the matter of selection; my only duty was to examine animals for soundness in wind and limb. I sometimes ventured to suggest that a certain class of animal was not useful, but I was informed in three instances that my position was simply that of the veterinary officer appointed to advise for soundness. I am sorry that Col. Appleton is not here, because certain remarks have been made to which I have no doubt he would have had a very good answer. Still, we are not here absolutely to discuss the army horse, but our horse supply, and I should like very much for some gentleman from the breeding districts to give us information on the other side of the question.

Mr. J. J. Bell: Mr. Brydon has made rather a startling statement as to the supply of brood mares being plentiful in this country. In the two counties of Cumberland and Westmoreland we have very few mares indeed. I can look back to the time when as a young man I have gone to a farm where they were castrating eighteen to twenty colts in a morning and now probably only one or two. Throughout the whole of Cumberland you cannot get more brood mares for breeding hunters and saddle horses into a showyard than about ten or a dozen; whereas in the old days I have seen thirty or forty. There is therefore a scarcity of brood mares. No doubt the reason of it is that a great number of the mares have been purchased by the foreigner. They may not be purchased directly from the farmer, because the foreigner has his agent in some local horse dealer who picks out all the useful mares he can get hold of, and that I believe is the reason for the scarcity of mares at the present day. I also well remember the the first year when the Royal Commission gave premiums for horses; I believe it was the year when the Royal Show was held at Newcastle. I was approached by the late Sir Jacob Wilson as to what I thought about the scheme, and I told him I thought they had started at the wrong place. I said, "You should give a handsome prize for brood mares for the supply of horses to the country, and then the probability is that you will get plenty of animals offered to you for sale." Anyone knowing Cumberland, and particularly horse owners, would know that they were always ready to supply a stallion if they could get mares. Singularly enough we have not three men in Cumberland at the present day beside myself that keep thoroughbred horses. At one time you could have easily seen twenty. They do not give the price now for the mares. The Royal Commission horse comes down to Carlisle, charging 50/- a mare, and that does not pay the man. He gets a prize with that horse, but he reduces the value of the service of the animals which compete with them. It does not pay a man to keep a stallion at the price he gets for service, particularly when the numbers are so few. My own opinion is that we could find centres in Cumberland and Westmoreland for breeding horses that would be very desirable if the Government would give it their consideration. There are great tracts of land, good grazing pastures, that could be had for that purpose in the dales of Cumberland and Westmoreland. A very large number of the Dale ponies and cobs went to South Africa, a hardy class of animal, healthy and sound. It is a question the Government ought to consider, either to have breeding centres or to give a respectable price for the produce when they buy them. £40 is no use at all for a four year old horse. If a man has a good mare he is not going to sell his animals for £40. The whole thing must be carefully gone into. No doubt it will be an expensive thing for the country, but our troops have to be well horsed and to do that means a large sum of money.

Mr. J. W. Coe: I agree with the last speakers with reference to the supply of horses which have won prizes under the Royal Commission. It strikes me very forcibly that it is a strange thing that these horses should be sent down into the country to serve at a low price, and the produce in many instances to my knowledge sold to the foreigner. A horse dealer was telling me only last week that he acts as an agent to many of the foreign Governments, and he told me that the price does not stop them. The English Government will give £40 for a good horse, but to the Continental buyers price does not matter at all. They can go to practically what they like. In that case it seems a strange thing for us to give a prize of £150 for these sires which are distributed all over the country to serve at low prices, £2 2. There is no reason why the man should sell a good horse to the English Government if he meets with a foreign buyer who is prepared to give a better price. If he has a better market, why should he not take advantage of it? Horses in the Midlands are very scarce. If this Association could make some representation to the Government I think it might bear a little weight. It certainly could not do any harm. The financial question is the crux of the whole thing; if they gave more money for them I feel certain the animals would be produced. (Hear, hear.)

Mr. S. H. Slocock: I am not going to enlarge on the paper, but I think our thanks are due to Colonel Appleton for bringing the matter before us. He has made many mistakes in his paper, but he has pointed out one or two things that are very useful. In his opening remarks he assured us that a regiment of yeomanry used to come out self-mounted, while now only 10 per cent of them are self-mounted, and that shows us the difficulties that have to be contended with at the present day in mounting any regiment. Then the regiment mounted itself, which meant that every farmer had on his farm a sufficient number of horses for his sons to mount themselves, and was able to keep that stock back when he had put his surplus on the market. I suppose now the yeomanry all go out on hired animals, and to my mind that shows the difference that has taken place in this country in breeding. A mistake made in the paper is this. The Author tells us that every man should breed to type, that he should select his Shire horse, Clydesdale, Hackney, thoroughbred, or what not, and breed to type. I contend that if a man wants to breed to pay he must breed to the best of the type, but so sure as he breeds to type he is getting away from the production of the horse that this country wants for the mounting of its troops. I believe that nothing of late years has reduced the provision so considerably of riding horses as the breeding to type. We have developed the Shire horse. Some of us can go back to the days of the early Shows, and remember the Shire Horse Shows in London. What type of horse came? There were horses there about as little like a Shire horse as one can imagine. Now they have all come to type, and are very far away from the horse we want to mount our men upon. It is the same with the Hackney. There were riding horses in the Hackney classes many years ago; there are no riding horses now. We have gone away from the type of mare in the country which mated with a good thoroughbred horse would produce a good remount. The mares in the country capable of breeding remounts no longer exist. The foreigner may have bought them, but I think it is more likely they have become extinct. The only mares, to my mind, likely to breed any considerable number of remounts are the mares still in Ireland, where the Shire horse, the Hackney, and the horse of the present day type are almost unknown. We have there mares with crosses of blood innumerable, the best thoroughbred breeding, and those mares are producing every year animals well calculated to carry any man in any part of the globe. All we want is a Government that will give money enough to secure the best of them. A man breeds a horse with the idea of breeding a hunter, and if he breeds a valuable hunter he has a good market. If he breeds something that is not quite a hunter then he has a trooper, and if it is a good one the foreigner takes it at three years old; if it is a middling one the Government will have it. I think Mr. Howard explained very well the lines of breeding in that country. I think the tale he told about the buying of remounts is as true in this country as it is in Ireland. In this country, looking through the productions of different farms, the Government buyers have not had their horses of a type classed together, and they are not sufficient judges to pick out the odd horse. It is the dealer that picks out the odd horse of a type, and then he places them altogether, and all the horses of a type being together look very much better. Our President this morning in his Address made a little remark about the veterinary surgeon examining the stallions throughout the country. A thing I should like to see instituted throughout this country and Ireland would be that every stallion travelling should have a licence to travel (Hear, hear), and that licence should be renewed every season, and he should not be licensed unless sound. I think if we did that we should do a great deal towards the production of sound horses in the country. Colonel Appleton says the breeder would take all the risks in matters of soundness and the Government as regards suitability. Supposing the breeder has an unsound horse, he has a useless animal on his hands. I contend that any man breeding with crosses of blood is not breeding to a type. I contend there is very little type in the thoroughbred horse. We have so many types that we cannot say that any man breeding from one of these mares with a lot of crosses may breed an animal of any type. The best brood mares I have seen for breeding high class hunters have almost invariably been animals of a middling type, and a mare might be probably the last mare in the world you would pick out for breeding high class hunters and yet she produces a valuable horse every year. Of course one mare produces one foal, and it would seem that you would be getting very little further forward in allowing a premium in any way to that mare, but there are mares of that type that require a lot of encouragement. I do not see how it can be done because it is such a slow matter. Colonel Appleton speaks of mechanical traction—that it has not done the harm it is said to have done, and he tells us that the builders of victorias in London are busier than ever. I cannot credit it. One sees good carriages sold at very ridiculous prices, and I think he must have made a little mistake there. I do not know whether anything might be done with the mares cast from the British Army. They are often of a very good type and some come out not too old, with no unsoundness. They might almost be given to the farmers who would be likely to sell to Government. I think if the Government would give what we all agree to be fair price for a useful animal those mares might be made use of. (Hear, hear.)

Mr. JAMES McGAVIN: I am from a breeding district where we have tried to rear the best horses we could. For the last twenty-five years our attention has been principally devoted to Shire horses, simply because the farmer finds it does not pay to raise Hackneys. He will give £3 or £5 for the stallion, and then he has the expense of rearing, and he expects £80 for a grand hunter, but the animal may get a nasty gash, and all his profit has gone at once. He has another thing to contend with. After he gets the horse four or five years old he wants a market for it, but we have very poor markets for hacks or remounts for the Army. It is all very fine to ask the Government for anything. I have attended the National Veterinary Association meetings for years, and almost every year we are going to apply to the Government for money to carry out some scheme or other, but I do not think anything has been really done yet. There is the question of mallein, there are glanders, tuberculosis, and various other things, and we never get any further forward. To wait until Government gives us money will be to wait for a very long time. In our district we have two gentlemen who have taken a great interest in the rearing of horses, Lord Joicey and David Davis. Lord Joicey bought a Hackney horse and gave it to his tenants, and he also hired another horse. He gives them another £100 a year, and he says to them, "Manage the Society how you like, do what you like, and charge what you like," and as a rule the tenants get it for ten shillings or a sovereign. They get the best horse they can get for the district. Mr. David Davis has bought a horse out and out, "Lively Bird." It is a thoroughbred horse, 16·2 hands high, and it travels throughout the district. He gives that horse to the Association composed of his tenantry with a few others added to it. The charge to keep the Association up is either 10/- or £1 per mare. That has been only going on for the last four or five years. In the rest of the neighbourhood, which is as good a neighbourhood as you can get to rear good Shire horses, if several of our landed proprietors would do something of the same kind it would be one of the best things to enable us to obtain good remounts.

Mr. F. G. Samson: Our thanks should be due to Col. Appleton for composing this paper, and it is a pity he is not here, because one does not like to say too much in a man's absence. I may be wrong, but there are certainly one or two things about which it seems to me he knows nothing at all. In the first place he says that the carriage builders in our great Metropolis have more work than they can do. Now if he were here I would tell him that he can go to Tattersall's any week he likes and buy a splendid victoria for less than 15 guineas, a vehicle that cost 120 to 130 guineas to build not twelve months ago. The carriage builders in London are practically all broke to the ground. They are all building motors, but they cannot live on that, for they go wrong. I have often thought that if a war were to break out again we should be in a parlous position. Whatever would our Government do for horses to carry the men? It is a very serious thing. It is no good going to Canada. I know some of the biggest dealers in the British Isles who have men out there. Tillings' people have men out there, and the London General have them there, and yet they cannot find the horses. They are not there to be had. Our largest dealers have not had any horses from Canada, excepting a few odd ones, for two years. That was one of our great supplies during the late war. Again, the horses which stood the wear and tear and hard work and came out best were the London 'bus horses. Can they get them now? No. There are ten to fifteen thousand put on the market, and they will not be able to get them any more. One thing has been spoken of by Mr. Howard and by one or two other gentlemen which is quite true: there is a good deal too much red tape in the Army, and it is to be found at the top of the Army. The veterinary surgeon in my opinion has not yet taken his proper place in the Army. He has a back seat, and I will give you an instance. I was in a dealer's yard some eight or nine years ago and I wanted a horse, but the dealer said, "You cannot look at anything this morning as I am showing to the Army." I stood there, and the Colonel there said, "I shall not have that one." And that horse was sent back. I think the price was £45. The dealer said, "Come and have a look at this horse, Mr. Samson." I asked, "Why would not he have it?" and he said, "I do not know—he is going to Paris to-night and a good job too." That horse made £85 on the following Monday in Paris. I asked the veterinary surgeon afterwards why he did not pass that horse, and he told me that he had nothing to do with it, that he had simply to stand there like a fool and look on. My idea of purchasing horses for the Army would be for the veterinary surgeon to purchase them. Because a man is a Colonel, or because he is at the top of his regiment, is no reason why he should understand the purchase of horses, any more than he understands when he walks round the kitchen table whether the beef is fit. The veterinary surgeon in the Army has been under the colonel of the regiment, as the veterinary surgeon in the municipality is under the Medical Officer of Health, and I think that should be altered.

We are not breeding so many horses because the mares are not here. For years and years both the German and French agents have been purchasing our mares, buying them under the hammer at Tattersall's and at all the good repositories. They do not stick at the price. Where an Englishman would give £40 they would spring another fiver. What few mares we have in the country are worse than useless—there are very few, and what few there are are very bad because they are simply the leavings.

Mr. F. L. GOOCH: I think Mr. Slocock has hit the nail on the head when he says the reason why we have not sufficient horses is because we are breeding to a certain type. If the Government would take up that same position that our horse breeders are, the Shire Horse Society, the Hackney Society, and the Hunter Improvement Society, and go on the same lines, there would be still plenty of horses for the supply of the Army. I believe it is a fact—I do not think it is a secret because I heard it myself at the last Council Meeting of the Hackney Society—that a gentleman in this country came forward and offered to loan the Government £30,000, ten years free of interest, and at the end of that time they could have the £30,000 again at the rate of 5 per cent., if they would supplement it with £30,000 more, and endeavour to establish the breed of the horses they wanted for their Remount Department. It was a Hackney man that offered it, but not for the breeding of Hackneys; it was breeding horses useful for remounts. It was to be on the lines on which the Hackney Society, the Shire Horse Society, and the Hunter Improvement Society are going at the present time. All our horses are bred up to type, and unless they are up to type they are not saleable either in this country or to the foreigner. Mr. Slocock mentioned a licence for stallions, a veterinary surgeon's certificate, whether for racehorses, or hackneys, or cart horses, or hunters. That is coming to the fore. We have not the number of horses in the country at the present time. There is a Show going on at the present time where there are 535 horses stabled in different classes and that does not come out to 15 horses per class, although the prizes that are offered are £15, £10, £5, and £10, £5, and £3 in others. There is not the slightest doubt that the best of our horses are going abroad, and it does not matter whether it is horses or cattle. In the sales held at the Royal Show this year the highest prices were given by foreign Governments. At the big repositories at Peterborough and other places the foreign buyer is looked on as the best man they can possible have for prices. The opener of this discussion thought a way out of it would be to establish some regiments with horses from 14·2 to 15·2, but I believe that would be almost impossible. A good horse 14·2 would be a suitable animal for almost any regiment, but I think you would find it was the horse most difficult to be found and most difficult to get at. You will find that in any class our largest horse dealers will give big prices for horses of that type. Mr. Howard mentioned something about the competeucy of the officer that bought. I do not know whether his experience was like mine. I do not think it was the competency of the man, but it was what he had offered to him. I could tell you instances during the late war in which farmers took their horses to a certain station that was named by the Government and the horses were refused by the officer. They were immediately bought by dealers and were accepted. I cannot quite agree with the opener of this discussion in saying that five per cent would be about the number of mares taken by the foreigner out of this country. My experience in connection with sales, particularly during this year, has been in the opposite direction. I believe in some of the largest sales in the spring held at the Peterborough Repository, where there were 600 or 700 horses stored on the three days, at least 45 per cent was bought on behalf of some foreign Government. Only last Monday we had three or four dealers from London and other parts of the country, each of them buying for some foreign part. A great many were bought for Vancouver. I think 45 per cent is nearer the percentage going out of this country from our public sales. In any district I have been in I have found the men buying practically for no one else except the foreigner. Looking at the matter from the standpoint Mr. Slocock spoke about, if the Government wish to have a depot for the supply of remounts they must go on the same lines as the large Societies are going on at the present time; they must offer premiums. If they would only accept this offer of Mr. Evans of Reigate, who made the offer in public, it would be of great use. I do not quite agree with the essayist in the number of yeomen that are not farmers. That may apply in some of our large centres, but we still have the farmer; we still have those who in our country districts are able to ride to hounds, and at least 75 per cent of the County Territorials are farmers' sons who take their own horses, and not only have one but frequently have two. At the last meeting at Lincoln I think there were 182 horses, the property of the farmers themselves, offered for sale after the Yeomanry had broken up.

Col. STEEL: I should like to say one word with regard to the hint rereceived from one of our members with regard to the use of mares cast from the Army. They are of more value than perhaps is generally supposed. These mares you must recollect are animals which have stood the test of eight, nine, or ten years service in the Army, and they are the very plums; they have been through the mill and proved to be very good. They have been well fed and exercised and kept in the very best condition, and are very useful animals indeed. It would be a very useful thing if the Government would set to work to create a reform in the production of horses.

The PRESIDENT: I should like to ask Col. Steel what percentage of mares sold out of the Army, after being in the Army eight or nine years, would be able to breed.

Col. STEEL: I cannot say. Some would breed, and if they were given away, almost, they would be very useful animals even if they did not. They are very valuable for a farmer.

Mr. SLOCOCK: They breed up to 20.

Col. STEEL: I think there is a spark of hope that some of the existing institutions may tend towards a particular class of horse required. What better remount can we have than the type of hunter, and the Hunters' Improvement Society may be doing us good. The hunter I contend is the proper remount. On service we do not require a peacock, one that is adapted for reviews. We want horses that can go across country, a horse that can save a man's life taking him across country when pursued by an enemy, or save a man's life when he is pursuing the enemy, and therefore the hunter is the type required.

Mr. E. J. CROWHURST: I think this matter resolves itself into a question of money. If a farmer can make it pay he will soon have the class of horse required. It is not many years ago since cart horses were developed. Now there is no trouble about the foreigner. buying the mares or horses, and they give as much as £500 or £600 for stallions for cart horses. Why should not they be able to cultivate the breed of horse the Army requires just as they have done with the cart horse? I think the system of sending thoroughbred stallions round would be very much better if it were doubled. You can have nothing better than a thoroughbred horse. You get a sound horse, an approved animal in every respect, and he is a most competent animal for remounts or any other class of animal of a hunting character.

Mr. SAMSON: An old screwy mare?

Mr. CROWHURST: If you do not use a sound animal how do you expect to get a good result? For the Government to expect a man to breed horses up to four or five years for £40 is a most ridiculous thing. The farmer has to run the risk of the loss of his mare or of the mare being barren, or of the foals doing all sorts of things, and the risk is too great for the money. He cannot do it.

Mr. A. Renfrew: I can do nothing more than bear out what has been already said. Many meetings have been held already with Lord Carrington, who was at the head of that Committee. A gentlemen I know very well, Sir Charles Rushert, was appointed one of the buyers. He has been appointed for two years, and he says he has only seen three horses in two years in the whole of our country that were suitable for the purpose. They have debated this point over and over again, and have not arrived at any conclusion. I have asked whether they have come to any conclusion, and I understand very little has been done. We have talked a good deal as to how much ought to be paid, but I think it is not a question of whether it is £30, £40 or £50. The farmer at the present moment is in what we might call a depressed condition, and unless we can show him that when the animal is four years old he will bring more money than a cart horse will bring at the same age we shall not convert him. A farmer breeding even a decent cart horse at two years old can get the money the Government are offering for a four year old. If the farmer cares to keep that horse from two years old he is earning his own living. If he keeps him to five years old he must be a poor brute if he does not bring £50 or more. A bad cart horse will bring very much more than an inferior nag, and that is the point. If the Government are prepared to pay the farmer a price that will at least equal what he will get for breeding cart horses, then they will get the horses.

Reply.

Mr. R. Brydon, in reply, said: I have listened with very great interest to this discussion, and I sincerely hope it will not be without fruit. There is no doubt the Government admit that they are very short of remount horses. Lord Carrington acknowledged that the other day in the speech he made on the Budget, and he said he hoped shortly to be in a position to give £70,000 as an encouragement for the production of troop horses. Of course, we know what these promises mean; they do not often come to very much. However, I am sure they realise now that they are in a very serious position if war were to break out. The whole thing is in a nutshell, in my opinion. If they would pay a price that remunerated the farmers to breed the animals they would get plenty of horses. There would be no scarcity. Once let that be known and the horses would be ready. Farmers cannot be philanthropists; they have their rent to pay and their risks to run, and unless they get a good remuneration for their trouble they are not going to embark in the business. There are many other classes of horse-breeding paying better than breeding troop horses. Even if they gave £10 more than they do the farmer would be still doing very badly if he did not get some that would realise a great deal more than that. The Government could encourage the business very largely by giving prizes at the Agricultural Shows for the best horses suitable for the purpose. If they gave prizes for the best foals suitable for the army, the best yearling, and the best two-year-old, it would encourage farmers a good deal and would not pauperise them. They could give prizes for the best mares suitable for breeding remounts, and that also would help. One speaker said he thought I had made a mistake in estimating the number of mares that were exported. Well, the figures were not mine, but Sir Walter Gilbey's, who is a very competent authority. He went very fully into this matter about two years ago and that was the conclusion he came to, that the good mares exported did not exceed 5 per cent. of the total number in the country. But be that as it may, I am sure we have plenty of mares still left in the country, and there would be plenty of troopers produced if the Government would only pay a price that would enable us to do it at a profit.

A good deal has been said about breeding hunters. So far as I know breeding hunters is a very precarious business. You get more misfits in breeding hunters than in breeding any other class of horses I know of. If you do hit it you get a very valuable animal, but for one foal produced that turns out a great success and becomes a high class animal you are almost sure to breed three or four that are only medium, and some of them decidedly not that.

One gentleman spoke of the value of Dale ponies for crossing. That I can thoroughly endorse. We have in the Dales of Durham, Cumberland, Northumberland, and Yorkshire, a splendid breed of ponies that used to be used for taking loads from the mines to the smelting works. They stand from 14 to 14.3 to 15 hands, and these crossed with a thoroughbred would make an ideal animal for military purposes. Another gentleman spoke about the value of having stallions registered, and I think that is a most excellent idea. There are far too many travelling the country that are not only unsound themselves, but very liable to produce unsoundness. It is a great shame that these animals should go about the country serving mares at a low price, and they are almost certain to have a lot of unsoundness amongst their progenies.

Col. Steel: I think we might have your permission, sir, to give Col. Appleton a vyte of thanks for his paper, and I shall be glad to move that.

Mr. Renfrew seconded the motion which was carried unanimously.

[The meeting then adjourned till the following morning at 10 o'clock.]

SECOND DAY.

Thursday, July 8th.

Mr. George Bowman, President, in the Chair.

MALLEIN AND TUBERCULIN.

By Sidney Villar, F.R.C.V.S.

Gentlemen,—Whilst fully appreciating the great honour which your President and Committee have done me in inviting me to read this paper, I cannot but regret the duality of the subject chosen. Within the somewhat brief period which has elapsed since this invitation was extended to me it would be impossible to attempt to institute any line of research with the hope of gleaning any original fact either as to mallein or tuberculin to lay before this meeting, more especially is this so as for nearly two decades, since Koch in 1890 announced his discovery of tuberculin, and the Russian veterinary surgeon, Kelning, in the same year discovered mallein, the most able men in the medical and veterinary professions throughout the world have been working at these subjects, aided by, or at all events criticised by agriculturalists and the general public. Both mallein and tuberculin may be described as well-worn subjects and any paper read under such circumstances must largely take the nature of repetitions of the observations and views of others.

But if the purview of this paper is a wide one it possesses the advantage of offering you a large scope for discussion, and I venture to hope that gentlemen present will not only freely criticise any points I may raise, but that they will be good enough to give us their personal experiences of the value of mallein and tuberculin, and so add to the general knowledge of these subjects.

It is, however, impossible to anticipate that anyone can bring forward any facts which will shake our faith in the great value of mallein as a diagnostic agent in glanders, indeed it is as nearly as possible infallible as a test for that disease ; and as regards tuberculin, we shall probably all agree with the view expressed by Sir John M'Fadyean that the tuberculin test for tuberculosis in cattle "is when properly carried out one of quite remarkable accuracy" (*Journal of Comparative Pathology and Therapeutics*" Vol. xvi., f. 159).

I propose firstly to consider some details which are common to both the subjects of this paper and then to deal separately with mallein and tuberculin.

Both these substances are manufactured in the same way—B. tuberculosis and B. mallei—the active living bacilli which are the cause of those diseases are cultivated for several weeks in bouillon or broth to which a little glycerine has been added. As a result the broth is crowded with bacilli, which are then all killed by subjecting it to sufficient heat. It is then filtered through porcelain which removes all dead bacilli and débris, and the filtrate consists of a fluid which holds in solution chemical substances the precise composition of which is unknown, but which were produced or generated by the living bacilli in the performance of the functions of their life. This clear filtrate is the fluid we use in testing; it contains no bacteria, bacilli or living organisms of any sort. Carbolic acid ·05 per cent. is added as a preservative, and in this state we use it with the certain knowledge that it will produce no permanent ill effect in the animal on which it is employed.

It is advisable to use tuberculin and mallein of recent manufacture, but the material now supplied to us in hermetically sealed glass tubes is reliable for a long period, certainly for a year.

It is said to make no difference to the potency of tuberculin whether the bacilli employed in its manufacture are obtained from a human or bovine source, one would quite naturally suppose that a strain of bacillus from the more virulent—the bovine—source should be used. Be that as it may, we know from practical experience of their effects that the tuberculins now on sale in this country differ greatly in their strength, and that it is possible to obtain a tuberculin, made and sold in perfectly good faith, which will cause at least fifty per cent. less reactions than other tuberculins on the market.

It is regrettable that no standard of strength for mallein or tuberculin is legally provided for and insisted upon. In the absence of such legal guarantee we must protect ourselves by purchasing our material for testing only from manufacturers whose mode of procedure is well known to us.

Cattle for a period before and whilst undergoing the test must be kept indoors and protected from draughts, and as far as possible from excitement.

Horses may be tested in the open air, provided they are tied up and have some shelter, such as the lee side of a wall or under trees, and are clothed at night and not left unattended.

The injection should be made immediately beneath the skin—the needles of the syringes usually supplied are much too thick and bulky—for many years I have used needles supplied by Messrs. Arnold very little thicker than those used in human surgery, without accident of any kind—a big needle is not only needlessly cruel to the animal, but increases our difficulty in puncturing the skin.

The needle and syringe should be boiled before use or rinsed in a 5 per cent. solution of carbolic acid. The skin at the seat of the operation both in horses and cattle should be swabbed with a similar solution of carbolic acid or some other disinfectant, not that such a swabbing will render the skin aseptic, but should any ill effect arise subsequent to the injection we have the satisfaction of knowing we have taken every care in operating, and done all that is practically possible to prevent any untoward effect arising.

Personally I have never had any ill effect either to horses or cattle from testing, but have heard of cases in which anthrax and quarter-ill have developed very shortly after the operation and which have caused the safety of these tests to be questioned.

MALLEIN.

In making a subcutaneous injection of mallein for diagnostic purposes in horses suspected of glanders we look for evidences of reaction to the mallein of which there may be three, viz.: (1) a thermal, (2) a constitutional, and (3) a local reaction.

In the majority of horses affected with glanders all three reactions are to be observed within 24 hours of the injection of the mallein, and in such cases there is no difficulty in arriving at a definite and certain opinion that glanders exists—indeed the process of diagnosis in such well-defined reactions is delightfully simple and is absolutely reliable, but there are a number of cases in glandered horses where only one of the three reactions may be definitely exhibited and there are a still larger nnmber of healthy horses—or at all events horses which are quite free from the bacillus of glanders where we may get one of these three reactions supervene with some intensity on the injection of a dose of mallein.

It is such variations in the effects of mallein injections and the indications to be deduced from them which raise the mallein test to the level of a scientific process—a process the precise value of which can perhaps only be arrived at by much practical experience of testing. But given that the veterinary operator has this practical experience of the mallein test, with some knowledge of the history of the case under consideration, he is in a position in perhaps 99 out of 100 cases to say definitely that a horse is or is not affected with glanders.

Let us consider these three reactions separately.

The local reaction consists of a swelling, an œdema of the tissues, round the point of inoculation, it is the reaction to which the most importance is to be attached, and in my personal experience is the only reaction which invariably occurs in cases of glanders.

A typical local reaction commences as an almost circular swelling, standing well up from the surface of the neck around the spot where the needle puncture occurred and which is often two to three inches in diameter at the sixth hour after injection, it continually increases in size until at the 24th hour it may be seven or eight inches long and four or five inches in vertical measurement.

The swelling is persisent, always being evident for three or four days, often increasing in size up to the 48th hour, and amounting in some cases to a very considerable tumefaction of the neck.

The edges of the swelling are well marked, particularly at the inferior margin, due to the gravitation of the contained serum.

The swelling is firm to the touch until it has begun to subside, when it becomes "doughy" and will retain the impress of the finger for a few moments.

It is always extremely painful and the horse resents its being touched or cringes away from one's hand in fear.

In extreme cases the nose is protruded, the neck carried stiffly, and if suddenly moved or compelled to turn round, the horse will grunt or groan.

For diagnostic purposes such very marked local reaction is not necessary, the painfulness and the persistence of the swelling and increase in size after 24 hours is sufficient—the non-glanderous swelling will have much decreased in size or totally disappeared in 24 hours.

In exceptional cases the swelling will not commence until after 24 hours and will then become prominent, in such cases the horse is glandered.

In suspected horses it is therefore necessary to watch the swelling for at least 48 hours provided a definite result is not earlier arrived at.

Often in healthy horses the only local trace of the injection of mallein is the displacement of a few hairs at the site of the needle puncture, but we may get a local swelling. " In horses that are not glandered the local swelling obtains its maximum size during the first 15 hours, and by the 24th hour has almost entirely disappeared. Its maximum diameter is usually about three or four inches." (Directions for use of mallein issued by Royal Veterinary College, London).

Porch says (*Veterinary Record*, April 20th, 1907) " there is frequently a swelling with a vertical measurement varying from four to eight inches but only an inch or two in width, not tense or painful. This kind of swelling I do not consider as indicating that the animal is suffering from glanders—in fact, the vertical measurement is deceptive and useless; so far as size goes the horizontal measurement is the only one really significant."

I have frequently found a vertical swelling about the size of two fingers over the seat of innoculation and attach no importance to it even if it is present for 48 or 60 hours, provided it is not painful to the touch, neither do I regard as necessarily serious the tumefaction of two or more lymphatic vessels radiating from a small swelling at the seat of inoculation.

Hunting points out that in purpura hæmorrhagica the swelling rapidly forms and is large by the 24th hour, but if the horse is not glandered it has disappeared in another 24 hours.

I have had an opportunity of making a post-mortem examination of a non-glandered and apparently healthy horse in which the local swelling was very marked at the 12th hour and had not disappeared at the 40th hour, there was no rise of temperature in this case. The swelling was not painful and was diffused over the surface of the neck—it did not stand out prominently as the true glanders reaction does—this tumefaction of the neck was probably quite rightly attributed to the use of a dirty needle or to some septic condition of the skin at the point of inoculation.

In estimating the value of the local reaction we have to take into consideration

(*a*) Its size and shape.
(*b*) Its rapidity of growth and duration.
(*c*) Its sensitiveness to the touch.

The thermic, thermal or temperature reaction consists in a rise of temperature of at least (two degrees) 2°F within 16 hours of the injection of mallein.

Professor M'Fadyean in the directions for use of mallein already quoted says "provided the temperature was normal (under 101°F) before the injection it will rise two degrees or more (103° — 105°) during the next 15 hours if the horse is glandered, but it will remain practically unaffected (under 102°) if the horse is not glandered."

But it must not be taken for granted that a horse whose temperature rises two degrees within 16 hours of injection is necessarily glandered—indeed I would not accept any rise of temperature in itself as sufficient evidence of glanders—to be diagnostic we must also have some local swelling amounting to a local reaction.

Opinions as to the times at which the temperature should be taken so as to get a record of its rise differ considerably, thus in the directions for use of mallein already quoted it is directed that "the temperature must be taken at the 9th, 12th and 15th hour after injection. The Board of Agriculture in its Circular to Local Authorities of 26th August, 1907, name the 6th, 9th, 12th, 18th and 21st hours. Hunting, in his work on Glanders, says "I do not think any useful information is missed by not visiting the horse after injection until 16 hours have elapsed." (Hunting: *Glanders*, p. 63).

My personal records include only three glandered horses in which the highest temperature was registered previous to the 15th hour, followed by a fall at that hour.

	Time of Injection.	12th hour.	15th hour.	18th hour.	21st hour.
Bay Gelding. .	101·8	105	104·8	. .	104
Bay Mare. . . .	99·8	106	105·8	105	. .

In these cases the fall at the 15th hour is very small and no useful information would have been missed if the 12th hour temperature had not been taken.

The time at which the temperature of affected horses rises is variable. I have recorded a 2·2° rise—from 101·4 to 103·6—at the sixth hour and a rise of 4·6°, *i.e.* from 101·4 to 106 at the ninth hour.

My experience is that although the temperature may rise in glandered horses previous to the sixth or ninth hour it continues as high or higher until the 15th or 16th hour or if, as in the two charts above, it falls between the 12th and 15th hour, the decrease of temperature is so small as to be unimportant. But the highest temperature in glandered horses with a normal temperature at injection may not always be reached at the 15th hour. A dark bay gelding, shown by post-mortem to be glandered, and having a temperature of 101° at injection, was 103·6 at the 15th hour, and 104° at the 22nd and 36th hours.

In this case also the thermal reaction was sufficiently high at the 15th hour and the indication given was not affected by the subsequent slight rise of temperature. For all practical purposes if the temperature is normal at injection the temperature recorded at the 15th hour of the test is decisive of the thermal reaction.

But in apparently identical cases of glanders the temperatures will vary to an extraordinary extent as is shown by the following example. Two cart mares had been bought on the same day eight months previously from an infected stud. At the time of testing both were fat and in good condition, were at ordinary draught work in London and apparently in good health. At post-mortem both showed glanders nodules in both lungs, in each case several nodules were presented on longitudinal section of these organs, and in each the glanders lesions were confined to the lungs.

	Time of Injection.	12th hour.	15th hour.	18th hour.	21st hour.
Grey Mare	101	102·6	103·8	..	103
Bay Mare	99·8	106	105·8	105	..

In each an indicative thermal reaction was given at the 15th hour, but the variation in the individual rise of temperature was very marked.

In glandered horses whose temperatures are above normal at the time of injection the subsequent temperature curves are very often irregular and a fall in temperature is frequently shown as the following recently recorded charts will show.

	Time of Injection.	12th hour.	15th hour.	18th hour.
Cab Mare............	103·4	102·2	104	103·6
Bay Draught Gelding..	104	101·2	102·4	103·4
Bay Cart Mare........	103·4	102·8	103·2	103·6
Bay Cart Gelding	103	101·8	102·2	103·4

All of these horses were shown by post-mortem to be glandered—the first two were clinical cases, the last two were emaciated, but were at work up to a few hours before testing.

Hunting (*Glanders*, p. 64) says "it is inadvisable to make a mallein test of a horse with a temperature over 102·5. In cases where we test an animal with a temperature of 103° or higher, a fall of two degrees in 24 hours is a suspicious sign"—both these points are endorsed in the above charts.

The third—the systemic reaction—may be indicated by a depressed appearance, staring coat, irregular skin temperature, loss of appetite, hurried breathing, or stiffness of gait. Any or all of these indications may be found and with other reactions are of great diagnostic value. On the other hand, such indications of systemic disturbance are not infrequently absent in horses which are glandered and which are exhibiting both the thermal and local reactions.

I would submit that when glanders is present in a horse, the injection of mallein is usually followed by a well-marked thermic and local reaction accompanied by some systemic disturbance, but that when such positive diagnostic indications are not all present a local persistent reaction of a painful nature is in itself diagnostic of glanders: that a well-marked rise of temperature unaccompanied by a precise local reaction is not conclusive, but if accompanied by systemic reaction is in a member of an infected stud of the gravest suspicion and would warrant us in advising the slaughter of the animal.

In cases where the evidence afforded by mallein is suspicious but not conclusive we must re-test the animal—I have made such re-tests within a week with satisfactory results, using the opposite side of the neck for the injection—indeed in one case I had both marked thermal and local reactions, although the swelling from the first reaction had not entirely disappeared.

The Board of Agriculture in the Glanders or Farcy Order state such re-test must be made within 12 days, but not earlier than 10 days after the first test, and it is advised that a larger dose of mallein, say a dose and a-half, should be used for the second test, and the withdrawal of all restrictions upon movement is permissible with regard to horses in which this second application of mallein does not result in definite evidence of the disease within 48 hours.

This appears to be a weak point in the Glanders or Farcy Order and one of which I have practical experience. I consider it would be far safer if it were made compulsory that all horses known to have been exposed to infection should be re-tested at an interval of two months after the last reacting or clinically diseased horse has been removed from the stud.

It is known that there is a period after the invasion of the horse's body by the bacillus of glanders—the incubative period of the disease —in which he will not respond to the mallein test. What the exact incubative period may be is unknown,. it probably varies in different animals, for some individual horses have greater resistant power than others, either from increased natural resistance or from being in better circumstances of housing, feeding, or work. Also the virulence of the virus itself and the route by which it gains access to the body may all influence the length of the incubative period. Cases of natural infection would be more prolonged than in experimental infection—except perhaps in those cases of farcy where the bacillus has found a direct entrance by means of a wound in the skin.

Hunting (*Glanders*, P. 65) points out that Nocard experimentally infected a horse by feeding with glanders bacilli, but got no reaction to mallein until the 21st day, and that in some horses experimentally infected by Sir John M'Fadyean a reaction to mallein was given 13 days afterwards.

He further says (idem) "We should probably be certain to detect all infected by repeating the test in any stud after the lapse of 14 days."

But this important point must not be overlooked, that by frequently dosing a horse with mallein, it will acquire a tolerance to it, so that mallein will cease to provoke a reaction. M'Fadyean says (*Journal of Comparative Pathology*, vol. xv., P. 86) "it was definitely established that when the mallein test is repeated at short intervals (a month or less) a horse may cease to react, although still glandered."

This power of acquiring tolerance to mallein must also be taken into account when used to indicate the recovery or non-recovery of a horse from glanders—so that when used for this purpose a considerable time must be allowed to intervene between the tests. The French Government require as an indication of recovery that a horse shall fail to react to the test on two successive occasions at intervals of two months. A committee of the Royal Agricultural Society reported "that in practice the mallein tests should not be repeated oftener than every three months when the object is to ascertain whether the animal has actually recovered from glanders." (*Journal of Royal Agricultural Society of England*, vol. 64, P. 273).

This acquirement of a tolerance to mallein has led to the supposition that injections of mallein may with advantage be employed as a prophylactic of glanders—there does not appear to be any grounds for this supposition, neither do injections of mallein appear to exert any curative effect in glanders.

Mallein may be used for diagnostic purposes in horses, asses or mules. Jowett points out (*Notes on Blood Serum Therapy*, P. 156) "that in testing mules double doses of mallein should be used." Doubtless some gentlemen present have had experience of this—fortunately, or unfortunately, it has never fallen to my lot to test a mule for glanders.

TUBERCULIN.

When a dose of tuberculin is given by subcutaneous injection, which is the method at present chiefly employed, the local reaction is so slight as to be unobservable in the living animal.

The manifest reactions we get to tuberculin are two—the systemic and the thermal.

The Systemic Reaction. Well within 12 hours after an injection of tuberculin the infected cattle will usually show some signs of being unwell, such as capriciousness of appetite and loss of inclination to chew the cud, with "staring coat," coldness of loins and rump, and arching of the back, rigors and diarrhœa are often present especially in milking cows, but these symptoms soon disappear. There is usually a falling off in the milk yield for 24 hours or so: in cases of severe reaction this diminution of the milk yield may be more marked. I have several times known the yield diminished by 50 per cent. for some days, indeed in exceptional cases cows do not return to their normal milk yield until another calving, but the systemic reaction even in animals badly affected with tuberculosis is not always shown, some diseased animals do not as a result of the injection (even though there is a considerable rise in temperatnre) experience any loss of appetite or in milk yield or show any symptom of ill health.

The Thermal Reaction to tuberculin is a gradual rise of 2·5 F. (2½ degrees) above the average normal temperature.

To obtain the average normal temperature of an individual animal it would be necessary to register it several times daily for three or four days.

Ainsworth Wilson (*Veterinary Record*, Feb. 1908) says "The temperature taking might be commenced with advantage a week beforehand;

the morning and evening temperatures at any rate for the three days preceeding the test should be available." In a later paragraph this writer points out the great difficulty of making such prolonged observations in veterinary practice, and with this we all agree.

In the presence of such difficulties it is practically impossible to obtain the average normal temperature of the individual members of a herd, and under such circumstances we cannot do better than accept the figures issued by the Royal Veterinary College of London, in the directions for using their tuberculin, viz. "Animals in which the temperature rises gradually from the normal (between 101° and 102°) to 104° or more may be classed as tuberculous."

Authorities vary somewhat in their opinions as to the periods at which the temperatures should be registered.

The Royal Veterinary College of London direct that "ordinarily the temperature must be taken at the times of injection, and at the 9th, 12th, 15th and 18th hours afterwards." Some of the Colonial and Foreign Governments in the case of imported cattle ask for charts showing the temperatures at the time of injection, and at the 12th, 15th, 18th and 21st hours.

I consider the latter series of temperatures is the best.

Ordinarily a temperature which, though risen, has dropped by the 12th hour would not be a positive or even a suspicious reaction, an infected animal's temperature would not be on the decline at the 12th hour, therefore in practice the first time at which it is usually necessary to take the temperature is at the twelfth hour. But is it sufficient to cease registering the temperature at the 18th hour? I have no doubt that mistaken diagnosis may arise by not prolonging the observation until the 21st hour. A recent case of my own in a tuberculous cow bears this out.

Time of Injection	12th hour.	15th hour.	18th hour.	21st hour.
102	100·6	102	103	104·4

On frequent occasions I have met gentlemen who cease taking temperatures at the 15th hour: surely in all animals passed as sound on such temperature observations the test has not been properly carried out!

In cases where the rise in temperature—for in healthy cattle there is usually some slight rise—has not much exceeded one degree and has fallen by the 18th hour there is no need to continue the observation, but where the temperature rises to 103° at 18th hour, then in my opinion we are not justified in leaving the 21st hour temperature unobserved.

A practice I personally like is to take the temperature six or nine hours before, as well as at the time of injection, and at the same time on the day following the injection: we are thus able to compare the temperature of the 18th and 15th hours after injection with that of the same time of the previous day.

But not all cattle in which there is a rise from a normal initial temperature to 104 must be regarded as tuberculous. A sudden rise in the temperature to this point or more, with an equally rapid fall—a sudden jump in the temperature—is usually associated with some other morbid condition than tuberculosis.

The ideal chart of tuberculin reaction should have a good curve, the temperature should commence to rise between the sixth and ninth hour, should continue to gradually rise, have some persistence at its highest point and then gradually fall.

For the preparation of this paper I have recorded the evening temperature of 340 cows apparently in good health. It is obvious that in dealing with so large a number of animals, varying conditions of lactation, pregnancy, œstrum and general environment must have been included, also the animals must have been differently circumstanced as regards feeding, ruminating, drinking and resting, all of which have some influence on the temperature. Only seven of these cows registered below 101 F (the lowest point reached being 100·4 and occurring in two cows). The temperature of fifty-five exceeded 102, and that of two hundred and seventy-eight varied from 101 to 102 F.

The evening temperature of yearling bulls and heifers exceeds that of cows: in such, an evening temperature not exceeding 103 cannot be regarded as abnormal, and I always without hesitation test such animals, but it is not advisable to test a cow or stock bull whose evening temperature by much exceeds 102 F.

The temperature of young calves, especially those fed from the pail is very inconstant. In a herd of ten all in apparent health, the evening temperatures varied from 99·8 to 104 F. It is well known that from indigestion and other slight causes the temperatures of these young animals often varies to an extraordinary extent within twenty-four hours.

This erratic tendency of the temperature of calves makes the testing of such animals untrustworthy and undesirable.

It is common to hear stock owners and cattle men say they do not believe in the tuberculin test, and point out that a certain animal or animals failed to pass in January and passed in July, or *vice versa*, there should be nothing in this to shake one's faith in the test. It is possible for an animal to recover from tuberculosis in a few months, and it is certain that any animal may become infected with this disease at any time, but the incredulity of the layman is to an extent justified both by the accuracy and the inaccuracies of the tuberculin test.

Let me deal first with the latter. It must not be overlooked that a considerable period of time elapses between the invasion of the body by the tubercle virus and the capability of the animal to respond to an injection of tuberculin: experiments to determine the length of this period have been carried out by Sir John M'Fadyean, the Royal Agricultural Society, and by Nocard and Rossignoll. These experiments proved that the period which elapses after infection before a distinct reaction to tuberculin can be obtained is very variable, and may be anything from eight days to over seven weeks. (*Journal of Comparative Pathology* Vol. XIV. p. 71). During this period—the period of Incubation—the tuberculin test may fail to indicate the presence of the disease. It is well known also that it may fail, and often does fail to produce a reaction in animals far advanced in the disease; the probable explanation of this being that such highly tuberculous animals have themselves produced and hold in their organisms so much tuberculin that they are unable to respond to the test.

Then, again, the presence of, or the occurrence during the period of testing of other diseased or abnormal conditions may, as has before been pointed out, cause such variations of temperature as to negative the value of the test or lead to wrong deductions; we know also that cattle are tampered with by unscrupulous persons, who having become aware that repeated injections of tuberculin produce a certain amount of tolerance to its presence, do not hesitate to inject and re-inject an animal until for a time it will cease to react. The exhibition of febrifuge drugs and cold water, either swallowed or locally applied, may so reduce the temperature as to render the test misleading. Excitement, either sexual or from strange surroundings, and the near approach of, or the act of, parturition will sometimes (not always) disarrange the test.

With all these opportunities of error, is it to be wondered at that diagnoses based on the tuberculin test are sometimes wrong!

The very accuracy of this test is also liable to mislead the inexperienced non-professional man, because an animal which has recent and few tubercular lesions will frequently show a very marked reaction; its temperature will go to 106 or even higher, and it may be decidedly unwell for twelve or twenty-four hours; on post-mortem no tubercular lesion may be found, and the test is quite wrongly said to have failed. Veterinary surgrons who know the power possessed by the tubercle bacillus to take up its habitat and grow in practically all organs, tissues and membranes of the animal body will not assert that the test has failed, but will recognise that the lesion or lesions have been overlooked. Personally after diligent search the only evidence we have found in some cases has been caseation in some small lymphatic gland.

Professor Dewar (*The Veterinary Record*, 1907, p. 702) has said "Even although in post-mortem he might have had cases where he could not find a trace of tuberculosis he felt that the fault was his, and did not rest with the tuberculin." Romer (*Rev. Gén. de Méd. Vét.* 1906, p. 554) is of opinion that "the results shown by tuberculin injection are to be preferred even to the statistics obtained at abattoirs."

Usually the country veterinary practitioner has not the necessary opportunities or means for making a thorough post-mortem examination. Post-mortems on cattle at private slaughterhouses where carcases are to be subsequently used as food are altogether inadequate; yet this is the usual examination we have to conduct. We are not even permitted to open up possible seats of lesion, so that unless the *locale* of the disease is in the viscera or on the visible membranes, it is impossible to satisfy a layman that an error has not been made. For this reason it is perhaps not wise (as is done in mallein testing) to order the slaughter of reacting animals on the evidence of the tuberculin test alone. Another reason is that the lesion causing the reaction may be so small that if the animal is allowed to live it will recover, and cease to give a reaction to tuberculin.

I would be satisfied that such recovery had taken place in an apparently healthy animal if at two subsequent testings at intervals of two months there was no reaction shown.

Have injections of tuberculin any curative value in tuberculosis? This is a point upon which opinion is divided, personally I believe I have seen beneficial effects result from its use in tuberculous diarrhœa of cattle; then again some practitioners have asserted that the injection of tuberculin in young animals will act as a prophylatic of tuberculosis. I do not credit it with such power.

The tolerance which cattle may obtain to the action of tuberculin has been alluded to, and it is important to know at what period after a first testing a re-test may safely be made. I have experience of cows which have reacted to the test twice within a week, but there is no doubt that injections repeated at so short an interval will not always prove successful in inducing a reaction. Nocard who carried out extensive experiments found (*Journal of Comparative Pathology*, Vol. XVI. p. 67) that when the injection was repeated after an interval of one or two days only one third of the animals reacted, when after eight days not more than half reacted, but when fourteen days were allowed to elapse about two thirds of the animals reacted. An interval of twenty-five to thirty days after the first reaction was required, in order to insure a typical reaction occuring in all animals on the second injection.

In France also Vallée has made investigations into the fraudulent use of tuberculin by unscrupulous cattle dealers, and instituted experiments for the purpose of devising a method of testing animals which may have been to some extent protected by the prior injection of tuberculin.

As a result of these experiments, he advises that cattle which are suspected of having been tested a short time previously, should at the second test receive a double dose of tuberculin, and that their temperatures should be taken from the second hour after injection every two hours up to the 14th or 15th hour. He points out that under such conditions tuberculous cattle almost always react to a second injection even if the interval between the tests is only 36 or 48 hours. Such reaction is intense, occurs at a very early period and is very transitory —that whereas the temperature curve of a first injection is prolonged, that of a second test is indicative of a sudden transitory rise of temperature, so that after the 12th hour it furnished little guidance (*Rev Gen de Med Vet*, vol. xl., p. 161).

In the *Journal of Comparative Pathology* for March last, Jowett confirms Vallée's observations: he says that he "has found this method eminently serviceable. On several occasions on which it has been practised the majority of reactors exhibited the maximum rise of temperature about the seventh hour after injection, *i.e.*, when the test had been carried out in accordance with Vallée's directions."

Vallée also states that even in cows affected with pulmonary or mammary tuberculosis, repeated reactions may be obtained by this method of testing (*idem*).

Personally, I consider that for the diagnosis of mammary tuberculosis the ordinary method of tuberculin testing is of very little or no use.

The following chart of an apparently healthy cow, except that she had a chronic enlargement (hypertrophy) of one hind quarter of her udder, and whose temperature under the test rose only to 103·4 degrees bears this out.

Time of Injection.	12th hour.	15th hour.	18th hour.	21st hour.
101·8	103	103	103·4	102·8

In this case the rise of temperature only amounted to 1·6 degrees and did not reach to 104F.—so that on her chart the cow could only be regarded as suspicious of tubercle, yet the milk yielded by the enlarged quarter of her udder contained great numbers of tubercle bacilli.

Then again cows affected with some form of sporadic mastitis, and whose udders are free from tuberculosis may react to tuberculin owing to the presence of lesions in some other part of their bodies, and thus deceive the operator.

For the diagnosis of tubercular mastitis we must rely on clinical examination of the animal and the microscopical or biological testing of the products of the suspected quarter.

During the past two years some new methods of tuberculin and mallein testing have been exciting much attention. They consist in the local application of tuberculin or mallein to the skin or mucous membranes.

In the skin or cutaneous method, which is known by various terms, such as Endermic, Dermic or Cuti Test, a portion of the skin which the animal cannot well reach or rub—such as the sides of the withers or the back of the neck—is selected; after being shaved and cleansed, it is scarified to such a depth as to give rise to a slight oozing of blood and is then painted with tuberculin.

In operating in this way, Vallée found in tuberculous animals a very manifest cutaneous reaction by the 24th hour, which still increased and was most distinct about the 48th hour, and persisted with very marked characters four and five days after the operation.

He also found that "when strong mallein is diluted with an equal volume of boiled water and applied to a scarified area on the neck of a non-glandered horse, it does not provoke any reaction; but in three glandered horses similarly tested a very distinct local œdematous reaction was obtained from the ninth hour. Here, however, contrary to what is observed in the cuti-reaction to tuberculin, the phenomena disappeared very rapidly." (*Rec de Med Vet*, vol. 84, p. 308).

I am not aware that any British veterinary surgeon has published any record of the dermic form of mallein testing, but Trotter, of Glasgow, has conducted some very interesting and valuable experiments with the object of investigating the reliability of this method of tuberculin testing when applied to animals with an abnormal temperature. (*Journal of Comparative Pathology*, vol. xxi., p. 153).

Mr. Trotter scarified a portion of skin about the size of a penny at the base of the skull and applied the tuberculin with a camel hair brush.

In the experiment he tested 31 animals, and post-mortem examination proved the test to have been accurate in 20 of them.

Reinecke, a German investigator, was not even so successful as Trotter—of 25 animals submitted to skin inoculation, one showed a trifling skin reaction, this animal appeared on slaughter to be free from tuberculosis—of the other 24 animals which showed no reaction, eight were infected with tuberculosis. (*Journal of Comparative Pathology*, Sept., 1908, p. 257).

The evidence available at present points to this scarification test being much less reliable than the ordinary subcutaneous test.

For the local application of tuberculin or mallein to a mucous membrane, the conjunctiva is usually chosen, hence it is known as the Conjunctival or Ophthalmic Test.

This method of testing appears to have been extensively employed for the diagnosis of tuberculosis in the human subject, and it has been the subject of much experimental work by veterinary surgeons.

Jowett advises that for applying this test the animal's head should be raised, the eyelids separated, and seven or eight drops of tuberculin dropped on to the eye by means of a pipette—or as an alternative method, the raising of the upper eyelid and applying the tuberculin direct to the globe of the eye by means of a small camel hair brush.

This test should be performed only on one of the eyes, the opposite eye being used as a control. He further points out that for this purpose, one must use tuberculin to which glycerine has not been added in the process of preparation, as glycerine has an irritant action on the conjunctival membrane. (*Journal of Comparative Pathology*, March, 1909, p. 16).

The reaction consists in the appearance in from eight to 20 hours of conjunctivitis, it is not attended with a rise of temperature.

We are again indebted to Trotter for experimental work in connection with this method of testing—in the *Journal of Comparative Pathology and Therapeutics* for June, 1908, he gives the result of this test on 38 animals upon which he has operated, and states "The results of this series of experiments show that tuberculin brought into contact with the conjunctival mucous membrane is not so reliable a diagnostic agent as when it is injected subcutaneously."

A French committee has also reported unfavourably on the Ophthalmic Test—it points out "In bovines the Ophthalmic Test alone is a very untrustworthy method, and cannot pretend to replace the ordinary subcutaneous method."

The Ophthalmic Test for glanders has been very little used, and also appears to be of doubtful value.

Discussion.

Mr. J. Malcolm: I have come here to-day with considerable expectation of pleasure yet with some diffidence. It is a pleasure to come here to meet old friends, perhaps make some new ones, and discuss with them subjects of interest to us all. Yet is with some diffidence that I venture to open the discussion on this paper. The subjects are so worn and so hackneyed in some of their aspects that it will be difficult to say anything new upon them. Mr. Villar, in opening his paper, regrets the duality of the subject he has to deal with, but in spite of this he at once sets to work and deals with them conjointly where I think he might have dealt with them separately with greater advantage. For instance, at the bottom of page 99 you will find he treats of the manufacture of mallein and tuberculin together. He says, " Both these substances are manufactured in the same way. B. Tuberculosis and B. Mallei—the active living bacilli which are the cause of these diseases are cultivated for several weeks in bouillon or broth to which a little glycerine has been added." Now though we do not hear of two or three kinds of mallein, we do occasionally read of several kinds of tuberculin, and they are not all manufactured in the same way; and in a paper dealing with mallein and tuberculin without restriction of any kind one naturally looks for some information respecting the several tuberculins. For instance, if you take up an article on the subject of vaccination you will probably read that tuberculin t.r. has been used, or tuberculin p.t. or b.e. or something like that, and anyone who has not made himself conversant with the various types of tuberculin is at sea as to what is actually meant. It seems to me that in dealing with this subject we might well have had a short description of the various kinds of tuberculin and some account of their manufacture and their uses in practice. Mr. Villar, so far as I understand it, has limited his remarks solely to diagnostic tuberculin and its uses.

He makes the remark early in his paper that it is possible to obtain a tuberculin made and sold in perfectly good faith which will cause at least 50 per cent. less reactions than other tuberculins on the market. That seems to me a remarkable statement. I have read and heard fulminations against the tuberculin test by breeding societies and various other bodies, but I do not think I have ever heard or read anything more drastic than that—that it is possible one man shall condemn two animals for each one that another man with another tuberculin, in the same herd would condemn. I have no doubt that Mr. Villar is quite justified in what he says: that being so I think it is quite time some steps were taken by the veterinary profession to see that ineffective tuberculin is barred (Hear, hear). Nothing will serve more to bring the whole matter into disrepute than the possibility of such errors in practice.

Mr. Villar justly says that cattle for a period before and whilst undergoing the test must be kept indoors and protected from draughts, and as far as possible from excitement. I am sure we all agree with that. Every one of us who has been testing cattle knows the evil effects following excitement or movement during testing. We had an admirable illustration of that recorded by Schroeder and Mohler of Washington in an article dealing with the testing of swine. They found they could test pigs and get 99 per cent accuracy when they kept them absolutely at rest in crates, whereas when the pigs were allowed to go about, in the pen or otherwise, the accuracy was not nearly so great. That applies equally to stock of all kinds. Of course with regard to keeping animals indoors, a good deal depends upon the animal. For instance, cows that go out and in daily will not require to be kept in as long as young stock that are running free. If you put young stock up they may require to be kept quiet a little longer in order to get the same accuracy of result as with cows.

Mr. Villar refers to the injection under the skin, but he does not say anything about intramuscular injection. Some of my friends have been trying intramuscular injection, and they speak very highly of it; they seem to think they get quite as good, if not better, results by the intramuscular injection as by the subcutaneous one. I have not done much of that myself, but my friends speak very highly of it. He justly refers to the difficulty of using the needles and syringes now in use, and advocates a particularly fine one. My colleague prefers a very fine trochar and cannula rather than a fine needle. The trochar has a good strong needle, and by inserting the fine trochar and cannula and using the syringe he injects cows much more rapidly than he can with the ordinary syringe. I think, for cattle with thick skin, that is better than using the syringe with needle: there is less risk of breaking syringes and spilling the material, because you can leave the trochar in until you are just ready to inject. Mr. Villar is very careful about swabbing and trying to asepticise the skin as far as possible, but, as he admits it is no good, one scarcely sees the necessity for it where you have a large number of cows to do. If I have a herd of cows to inject I simply go right through them and do not swab the skin with disinfectants and so on, and I have never seen any bad results. I always take good care in those cases, if there is any tendency of the skin to cling to the cannula, to keep the skin down. In injecting subcutaneously, as in puncturing the bowel, I find there is far more harm in letting the skin be dragged up by the cannula than in any other thing. It will do much more good to keep the skin tight down on the subcutaneous tissue than to use disinfectants on the skin. That was very forcibly brought forward by Mr. Simpson many years ago, at a Birmingham meeting. At that time we were troubled with flank abscesses as the result of tapping, and he said if we only kept down the skin or incised it we should never be troubled with flank abscesses. I believe that is absolutely true.

Coming to mallein, I think we all agree with the general description Mr. Villar has given. It is so accurate, so much in accord with my own views and my own experience, that I have great difficulty in criticising it or saying anything except " ditto " to Mr. Villar. With regard to the percentage of successes at his first testing, I must say his success is greater than mine. He says, " A process the precise value of which can perhaps only be arrived at by much practical experience of testing. But given that the veterinary operator has this practical experience of the mallein test, with some knowledge of the history of the case under consideration, he is in a position, in perhaps 99 out of 100 cases, to say definitely that a horse is or is not affected with glanders." I cannot say that I have found such a high percentage of definite results, positive or negative, as that. I have got it in some small studs, but in large studs, and some evidently recently infected, my percentage certainly falls below that in the first test. Before I have done with it I get quite as good results, but not at the first test. I remember going through a stud of 96 horses and we got 25 horses reacting the first time—a very large number. The veterinary surgeon in attendance said he felt quite sure we should have one-third of them react. A number of those that did not react, or gave a very doubtful reaction, reacted distinctly on the second test. We followed the procedure suggested by Mr. Villar and tested them all a second time, and we found that half a dozen reacted markedly on the second time that did not react at first. It was not from any delay in the reaction, as has been suggested might occur in some cases, for the horses were tested at 6 o'clock on Saturday night and those that passed the first test were all at work at 6 o'clock on Monday morning with no swelling on the neck or anything to stop them going to work; and yet a fortnight afterwards half a dozen of them showed marked reactions.

Mr. Villar says that the swelling is persistent, always being evident for three or four days. In those cases in the early stages the swelling, what little there was, was not persistent, it was simply an indefinite reaction to begin with. I quite agree with what Mr. Villar says with regard to the character of the swelling, the heat and pain, and evidence of fear the horse shows when you go near him. He says, " In exceptional cases the swelling will not commence until after twenty-four hours and will then become prominent; in such cases the horse is glandered." I have had two marked cases of that kind. There was practically no evidence of swelling for the first 24 hours; indeed, in one case my colleague came back and said that the case was clear. Fortunately he visited it the next day and found a reaction. Ultimately the horse was killed and the accuracy of the deferred reaction was proved on post-mortem. As to the shape of the swelling, my own experience exactly corresponds with that given in the paper, both as to size and shape, the rapidity of the growth, the sensation and the sensitiveness to touch.

In many cases I find the temperature cannot be accepted as a real guide in diagnosing glanders. It is undoubtedly a real aid in many doubtful cases when the local reaction is indefinite, but by itself I do not think that anyone would put great weight on temperature alone. Many a time we have condemned horses without much rise of temperature, and accurately so.

As to the time of taking temperature, our usual procedure was to take them first at the 12th or 15th hour, and this seemed to meet all requirements of the case. We tested the horse either at 6 or 9 in the evening and took the temperature at 9 next morning, and subsequently later on as required.

I also corroborate the point raised by Mr. Villar, that if the temperature of a horse is high at the time of testing it may decrease as the result of the testing. I have seen that in one or two cases. Later on he speaks of a well-marked rise of temperature, unaccompanied by a specific local reaction, not being conclusive, but when accompanied by a systemic reaction it is, in a member of an infected stud, of the gravest suspicion, which would warrant the slaughter of the animal. Would that be by the attendant of the stud or by the inspector? As an inspector I should hesitate to condemn the animal; I prefer to let it stand over and test a second time. I consider that an inspector strengthens his position by never making a mistake. It is better in those cases instead of condemning the animal to put him on one side and re-test and be quite satisfied.

I agree with Mr. Villar's remarks about the Board of Agriculture Order. I think that we get better results by a second test of the whole stud a little later than after the twelfth day. If a horse has been infected just a day before a man tests a stud and has to be tested a second time in twelve days, it is possible that in some cases an infected horse may be missed. In a case like that I agree with Mr. Villar in thinking that a longer period would be better, a month or, as he suggests, two months. Personally, I think a month would cover it, and if the second test were performed in a month the inspector would be likely to get every horse.

I find Mr. Villar is rather sceptical about the curative effect of mallein, and believes that cases of presumed cure are rather cases of tolerance to the mallein. I think the majority will agree with that, although there are several members who have had a good deal of experience who maintain that there is some ameliorating effect from using mallein. It is very difficult to prove whether that is so or not. Some time ago we had four or five cases in a stud that were tested and all gave an indefinite reaction at the first test. This was a stud where a case of farcy had been removed six months previously. It was decided to retest that stud. The horses all gave indefinite reaction, or nearly all, at the first test—the majority of them gave an indefinite reaction at the second test. On the third test we were able to declare them all free. Whether the animals were slightly affected and gradually recovered, or whether the mallein had a curative effect, or whether the reaction was due to some other unexplained cause, I would not like to say, but there is the fact—we had undoubtedly a doubtful reaction at the first test, a doubtful reaction at the second, and were able to set them all clear at the third.

Perhaps a short record of our work in Birmingham might be of some interest to the members. I may say that for thirty years, until last year, Birmingham was never one year entirely free from glanders. Sometimes we thought we had cleared it out, as we could find no case for a time. Then a latent case became active or we had the benefit of having it introduced from outside, not a few cases coming down from London. One case we traced to Manchester and another case we got from Chester, and so on. Thus cases were traced back to other places than Birmingham. So that between one and another, for thirty years we were never entirely free for a whole year of glanders. As a matter of fact, for the four years previous to the present Order we had in Birmingham 48, 33, 25, and 34 cases. After the introduction of the new Order and the power to stop all animals and test them, we practically cleared the disease in three months. Altogether we killed 95 horses in the first three months, and then we killed five in the next six months, and since then, September of last year, we have not had a case and have no reason to suspect a case in the town. We are in the fortunate position now that we do not anticipate the introduction of cases from outside because each authority deals with them at home. I am hopeful that by the compulsory use of mallein the whole country will very soon be clear of glanders (Hear, hear).

Coming next to tuberculin, I am pleased to be able to say that my experience accords with the essayist in almost every particular, both as to the rise of temperature and the systemic reaction. The chief difficulty I find in testing cattle is the number of doubtful reactors. With a definitely positive or definitely negative result one has no difficulty at all, but there are nearly always a number that are doubtful, and it is the difficulty of reading those accurately that one has to contend with. When you get the temperature close up to 104, between 103 and 104, it is a debatable point in a considerable number of cases whether the case is one of tuberculosis or not, and then one has to be guided by the actual rise in temperature and by the curve of the temperature—the height at different periods. Mr. Villar agrees with that, and also says that little notice should be taken of a sudden rise, even up to 104, if it rapidly falls again. The true explanation of these doubtful cases would be of considerable moment to us, and I am hopeful that if we can get tuberculin of a uniform standard strength we may do something to keep down the doubtful cases. If we could only do that the matter would be very much simplified.

Mr. Villar thinks it is better to take the temperature at the twelfth hour rather than at the ninth; he rather favours the late than an early time. Personally, I am rather in favour of taking it at the ninth hour as well as, when necessary, at the later hour Mr. Villar mentions. If you are in practice and have to test recently purchased cows, and you know nothing of the previous history, it is important that you should get the temperature at the very earliest moment, and use strong doses. You have to treat a number of those cases as though you suspected that they had been tested before, and take all the precautions you can to arrive at an accurate result. The early taking of temperature in these cases is, in my opinion, of some importance. It has been proved, as pointed out by Mr. Villar, that when animals are re-tested a second time, soon after the first test, if a strong dose of tuberculin is used and the temperatures are taken early you have a chance of detecting these cases. I maintain that in cases that have been in dealers' hands, and which have changed from hand to hand, and you do not know whether they have been tested or not, if you can do anything to aid in arriving at a correct diagnosis you ought to do it, and therefore in those cases one ought to take the temperature at least at the ninth hour and at the later hours as well.

In connection with the question of second testing I had rather a curious experience lately. I went over to Ireland the other day, and when at Monaghan I met a breeder of shorthorns who told me of a bull having been over at Birmingham at the Shorthorn Show and Sale, and having been rejected. He said, "You do not know everything at Birmingham. When this bull came home my veterinary surgeon tested him and passed him." I said, "Did you tell your veterinary surgeon the bull was tested at Birmingham?" and he said, "No, I did not." There you have evidence of the necessity of cattle that have been moved about, even by your own clients, being regarded with suspicion.

Mr. Villar refers to the value of the clinical examination in some old cases, especially cases of mastitis, as an aid to the tuberculin test. In those cases undoubtedly you have to depend largely upon the clinical examination or the biological examination. Unfortunately the inevitable delay in some of those cases is a point against it. It frequently takes some time to get a biological result. But while depending on the clinical examination, I do not think one is justified in omitting the inoculation test; I believe in using both.

I think the question of the curative value of tuberculin is not yet definitely settled. We find some men, 'particularly in the medical world, who still maintain that tuberculin in some of its forms has a decided curative effect. Only the other day I read a book recently published by Dr. Wilkinson, of Sydney, who stated his belief that there was nothing equal to it. He gives a remarkable series of results at Sydney, and if his results are as he states there certainly must be something in it. Mr. Villar rather favours the view that it may have curative effect. I think it is still open to further investigation.

Then he deals with the conjunctival and dermic tests. We have tried both, but I cannot say that in my experience they are at all equal to the subcutaneous or intra-muscular tests. We tried them on animals that were proved by testing to be tuberculous three months previously, and we found that only a small portion of these gave anything like a reliable reaction, either to the dermic test or to the conjunctival test. The ophthalmic test is found particularly useful in children, and may be well worth trying in calves. The originator of that method, Wolfeisener, recommends simply the ordinary tuberculin in small percentage, not the glycerine-free tuberculin, and he gets equally good results. Therefore any of us can use it to see the effect. Calves, as you know, are very unreliable in testing on account of the variation in their temperature, but as the eye reaction does not affect the temperature, it seems to me there is an opportunity for further observation of the effect of the ophthalmic test in calves.

Mr. J. S. LLOYD: In the first place I should like to thank Mr. Villar for the very able manner in which he has dealt with the subject. As already pointed out by Mr. Malcolm, he has said things in a manner with which most of us will agree, but he has also not said things which perhaps it would be an advantage if he had said. The first remark that struck me in Mr. Villar's paper was the standardisation of tuberculin. I think it is a great pity that all tuberculin is not under the control of the Government (Hear, hear). I take it that as far as the tuberculin testing of animals is concerned, if the Government took it up it would be under the control of the Board of Agriculture, and I think that would be a step in the right direction, and would certainly give agriculturists very much more confidence in the tuberculin test than they have now (Hear, hear). The next thing I made a note of was the recommendation by Mr. Villar of very fine needles for use during the test. My experience has been something like Mr. Malcolm's, that is, to use a fine trocar and cannula, insert the needle into the cannula, and in that way get over the work very much more quickly. In no case do you get broken needles, which is the great trouble I found in using needles—they are always apt to snap. You cannot rely on the animals keeping perfectly quiet, and if they make a jump and you do not jump with them or allow your hand to follow their movements, the needle is snapped off. With regard to systemic disturbance, particularly in cattle, the herds of cattle I have had mostly to deal with in testing with tuberculin were those supplying milk to hotels, where the owner of the cattle was under a contract to supply so many gallons of milk twice a day. My experience has been even stronger than that mentioned by Mr. Villar in his paper. He says the reduction of the milk is often 50 per cent.; I have seen a reduction of milk nearer 75 per cent., but it was due to the very large number of reactions. My point is that the more reactions you get the more disturbance there is with the milk. If you have a large herd and have to supply a large quantity of milk, it is always better to test the herd in sections, one-third or a half as the case may be, so as not to interfere with the supply of milk which the owner of the cattle has to send away. Another matter which I think you have to take very great care of in regard to this systemic disturbance is to see that a large quantity of cold water, or in the winter large quantities of cold turnips, are not fed to the cattle during the time you are taking the temperatures, because that interferes very markedly, causing a rapid fall in the temperature.

With regard to post-mortem appearances, I was rather struck when reading the remarks on mallein to find that Mr. Villar kept carefully off the post mortem appearances in glanders. I suppose as a matter of fact they do not come within the scope of this paper. But reading further on with regard to tuberculin, you do meet with the point where he says that it is difficult sometimes to find any lesions of tuberculosis in cattle that have been slaughtered on account of reacting to the tuberculin test. My experience has been that in several instances—and I think there is a gentleman in the room who can bear me out, one who has been at the post-mortem with me—where some horses have been slaughtered after reacting to the mallein test, we found no evidence of glanders. We searched the nasal membrane and right down the respiratory tract, through the larynx and trachea to the lungs, and found no evidence at all; yet in four cases we got good reactions to the mallein test. If Mr. Villar could give us any idea as to what we should look for in the lungs, particularly in glandered horses when they react to the test and show no glandular nodules, I think it would be an advantage to us. The finding of lesions in tuberculous cattle has not been difficult in my experience. The number of cattle I have seen slaughtered, particularly in Manchester, was very large, and after making a very careful post-mortem examination, which usually took some time, I can only remember one instance where we failed to find any tuberculous lesions. Mr. Villar mentioned the curative action of tuberculin. When Koch brought out his second tuberculin, I think in 1903, he thought he had something that was going to be a curative agent. He buoyed people up who were suffering from consumption, giving them the belief that they were going to be cured. But that idea was not carried out, and people became very much despondent. Recently Dr. Nathan Raw, of the Hospital for Children in Liverpool, has carried out the treatment on a large scale with children suffering from tuberculous diseases of the joints and bones, and he speaks very highly of it. I do not remember now the particular tuberculin which he uses, but I remember reading in the *British Medical Journal* some six or seven months ago his speaking very highly of the curative effect of tuberculin in tuberculous diseases of the bones and joints of children. I do not know that I have anything further to add to the discussion, except to thank Mr. Villar for his excellent paper.

Mr. F. L. Gooch: The first thing I have noted in connection with the paper is the remark of Mr. Villar with regard to the recent manufacture of the material that is used. I think that is a very strong point, that we have to be very careful indeed to have a fresh manufactured material, either in mallein or tuberculin. Then I quite agree with the two previous speakers that we should have a standard both for mallein and tuberculin. We have thrown upon the country now both these things, and they are in the hands of dealers and in the hands of breeders. There are large herds now being tested regularly, not by the veterinary surgeon, not by any qualified man, but by the owner himself, who can procure tuberculin where he likes and how he likes. So long as we have that state of things we shall never have proper testing, nor shall we clear out tuberculosis. I think that when we have the fresh laws that are being made this should be a very strong point in them; also I believe the dose should be of standard quantity. We are told by Sir John M'Fadyean that in some cases we use 3 c.c., and in large bulls 4 c.c.. but that again shows the necessity for having a standard for tuberculin and mallein. I should like to ask Mr. Villar a question with regard to the period he would recommmend for the testing, the time that he would have animals shut up.

Passing on to the use of the trochar and cannula mentioned by Mr. Malcolm and Mr. Lloyd, I consider that in that we have rather a clumsy method. Unless you have a cannula that will exactly fit the end of the syringe you have the same trouble in not being able to have the whole of the dose injected under the skin. You will have the animal moving just in the same way, and unless you have the whole thing fitting practically hermetically, in all probability, if the animal moves, instead of the test getting under the skin you will have some on the top of the skin. I find nearly all instrument makers make their needles too long. (Hear, hear). If you have a short needle that fits well on, not screwing on, but fitting well to the aseptic syringe, and you place the short needle under the skin before you put the syringe on to it, then when you have the needle well under the skin you apply the syringe to the needle and you will have no movement probably of the animal, and there will be very little risk of breaking the needle. I do not believe there is an instrument maker at the present time who will supply the right needle unless you ask for it. Fortunately I have a father who is a very good mechanic and we make our own needles, and we very seldom break one. If you have a steel needle you can asepticise it, and if it is nice and short, just sufficient to get through the skin, you will have very few needles broken. I place very little reliance on the asepticising of the skin, and I more and more disbelieve in its being of value. I was very glad indeed to hear the remarks that fell from Mr. Malcolm with regard to the carrying out of the testing in Birmingham and the clearing of such a large city of glanders. We who live in the country districts are very thankful to say that we see very little of glanders, and when we do see it we can nearly always trace it to some big centre. If all large centres would take the trouble to do what the Birmingham Corporation have done—employ a responsible man to carry out the duties of ridding their borough or city of glanders and tuberculosis—if it were done in the same methodical manner Mr. Malcolm has done it, glanders would very soon be a thing of the past. Mr. Villar says that double doses have been used in testing mules, but he pleads guilty of never having tested a mule. I cannot see why a mule should require a double dose more than a horse, and perhaps Mr. Villar can enlighten us on that subject. Mr. Malcolm told us that it was very necessary indeed to be exceedingly careful in testing an animal that had just recently come into the district. It is said that there is roguery in every trade except that of the veterinary surgeon, and I find we have lots of animals thrown upon our market that have been just tested by the owners and sent to large centres for sale, and when they are being tested by the properly qualified and authorised veterinary inspector they have not reacted although those animals have been the subject of tuberculosis. I do not know how long a period must elapse after the first testing before it is necessary to test again, but it behoves us to be careful indeed, and I think Mr. Malcolm was quite right in saying that it was very necessary to test as early as possible, and take the temperature as early as possible after the testing. It behoves us to encourage our clients to have as many as possible of all herds tested when any animals are introduced into a thoroughbred herd. We find that not a single animal is allowed to go into any foreign country if it reacts. In all our big public sales, particularly of the shorthorn breed, at Birmingham, York, and different places, you will find those animals that do not react, and are sold with the certificate of non-reaction, will make practically 100 to 200 per cent. more money than one that has never been tested.

I have generally found that the 18th hour has been sufficient to tell me whether I have a case of tuberculosis or not. But certainly in the future, if I have this gradual rise of temperature, I shall test at the 21st hour. I should like to ask Mr. Villar whether he can tell me the highest rise of temperature he has had in an animal that at the time of testing presented a normal temperature, and the highest temperature he has had in one that has reacted. I was very much struck with a case that I tested only a fortnight ago—a shorthorn bull. This bull presented a normal temperature the day previous to the testing and at the time of testing, but at the 12th hour his temperature had gone up to 107.4 from just under 101. I wish to bear my testimony to the ability shown in the paper and thank Mr. Villar for it.

Prof. J. R. U. DEWAR: In response to your call, Mr. Chairman, I may make a few remarks in connection with the excellent paper Mr. Villar has prepared for us on a very interesting subject. It is especially interesting in connection with the step which the Board of Agriculture is now contemplating of doing something in connection with this disease, tuberculosis. I read over the paper in the train, and I made a query on page 100 with regard to the amount of carbolic acid that is added to the tuberculin. I was under the impression that more carbolic acid than .05 per cent. was necessary for preservation of these serums. It is an exceedingly small amount, if that serves to preserve it. You would hardly know it in your soup. The next point I wish to refer to has been mentioned already, namely, that cattle for a period should be kept quiet while undergoing the test, and especially before the test. After the test is over you can do anything with them you like. Mr. Malcolm referred to the matter also in dealing with cows from dealers, or that had newly come into the district, and insisted on a larger dose of tuberculin being given and greater care being exercised. My habit in regard to these cases is to take so much care as to tell my client that I place very little reliance on the testing of an animal that has recently passed through the hands of a dealer. I do not think the tests should be considered reliable under those conditions. If you are to rely on the test the animals must be in a condition where they have not undergone much change either in food or anything else, such as œstrum in females, and so on. Everything makes a difference. I do think that in the winter months in Scotland, where the cattle are more in the house than they are in England, when the cattle are all quiet and the circumstances are unchanged from day to day, I can rely on 98 per cent of correct reactions in testing. There are very few doubtful ones if you get the animals under proper conditions.

With regard to mallein, the only thing I differ from Mr. Villar and Mr. Malcolm in, although perhaps I have not had so much experience as either of them, is the local reaction to the mallein test. Almost invariably I find the vertical diameter of the swelling is the longer one, and not the transverse ; it is as sure as fate. We have it in the middle of the neck and it comes down, as any fluid will, by gravitation, and you have the long diameter of the swelling vertically and the short one, as a rule, transversely. That is my experience and one can only give one's experience. I have also for many years been in the habit of taking temperatures longer than the 18th hour when required ; that is to say, if towards the end of the testing I found the temperature was rising and getting a little suspicious, and it had not been sufficiently high before, and was not sufficiently high to decide the test, I would take the temperature again up to the 24th hour. With regard to taking it early, there is no use shirking our work. If we are going to test animals we ought to test them carefully, and make as certain as we possibly can of our test. It is quite easy to begin early. I once found the highest temperature I have met with in an animal reacting to tuberculin at the seventh hour. I do not mean to say the animal would not have been caught if I had not taken it until the ninth or twelfth hour, but I found the highest temperature in that case at the seventh hour.

Mr. Malcolm made a few remarks in connection with horses that did not react to the mallein test after he had tested them three times. We all know that in these contagious diseases there is a certain incubating period and we all know that everything must have a beginning. Are we going to suppose that an animal will not react to tuberculin or mallein after it has become infected until there is a lesion large enough to be seen by the naked eye ? I do not for a moment believe it. Undoubtedly the virus of the disease will be acting in the constitution of the animal before there is a lesion big enough to be seen by the naked eye, and if the animal happens to be tested in that time of course you may expect to have the same reaction as you would have if there was a large amount of disease present that could be seen on post-mortem. I am very pleased to congratulate Mr. Malcolm on the way he has got clear of glanders in Birmingham. But I have known an animal affected with latent glanders for more than a couple of years, and we get animals coming into Edinburgh with those wandering people who dwell in tents. They come from Birmingham, Sheffield, and other places, and their animals occasionally turn out to be glandered. When we begin to enquire into the history we find they have been bought in the market from some man whose name they did not remember. It is very difficult to trace these cases. It is wise not to be too sanguine, and I hope Mr. Malcolm will keep a sharp lookout for the presence of glanders in his borough still.

In the diagnosis of cases of tuberculosis of the udder after slaughter, referred to as mammitis or mastitis, referring it to biological examination takes a very considerable time. Why not make a microscopical examination? Nineteen out of twenty of these cases you will be able to diagnose by the aid of the microscope, and that method does not take nearly as long as a biological examination.

I have very little faith in the curative effect of tuberculin, although I may be wrong. I hope Dr. Nathan Raw will go on and cure as many as possible, but I hope he will have an equal number, or a considerable number, of what we may term control cases in the children. You must remember that these children are all under the best hygienic and dietetic conditions, getting everything that may possibly assist a cure. If you inject a considerable number with distilled water at the same time as you inject others with tuberculin, and put them all in the same hygienic surroundings and see the results, more information will be obtained. We all know the efforts that have been made to obtain an immunising serum. A man much better known than Dr. Nathan Raw, Dr. Von Behring, has deceived us, or deceived himself, or at least has excited hopes that have not been realised, as to the use of serums in the cure of tuberculosis. I admit that they are making progress in that direction.

With regard to the non-reaction to mallein, it is very much on the same lines as I have referred to in connection with tuberculin; there is an incubative stage, and when that stage ceases it will be some short time before you can expect to have a lesion large enough to be seen by the naked eye. I look at it very much in this light. You are testing a stud of horses or a herd of cattle and you have an animal that clearly reacts. It is slaughtered, and you make a post mortem, and you cannot find anything. Why did that animal react? There was some cause for its reacting. Supposing you cannot find anything and you know no other cause, and you can rely on the history and on the attendants and on the owner—although one cannot always do that—trust your tuberculin or mallein if it is correct in other cases. There is some cause for it you may rely upon, and the cause is that that animal has recently contracted the disease.

Mr. A. Spreull: I am sorry, sir, you have called upon me to speak because this is a subject I do not know very much about, at least, as far as glanders is concerned. In Dundee we have only had three outbreaks during the course of my forty years experience. During that time, however, I had at least one case that would probably interest the audience. In the first outbreak we had nothing remarkable to relate; it was just the ordinary form of the disease, four or five animals being infected, and they were slaughtered out promptly. The disease then disappeared, perhaps for another twenty years, and then a case occurred which I am totally unable to explain, and which troubled me, and puzzles the most expert to explain even now. The case occurred in a dairy where they kept about half-a-dozen horses. This horse was bred within four miles of Dundee and had been known to me from its birth to its death. All the surroundings were absolutely free from any possibility of contagion in connection with any other case, because we had no disease either in Dundee or in the neighbourhood. At four years old he was transferred from the breeding place to the dairy, and in the dairy he contracted the disease, and how he contracted it is the point I wish to have explained. The horse first of all took farcy, which gradually developed, and the first farcy buds were beautifully illustrated. Abscesses formed on the lymphatics in the hind legs and the fore legs, and ultimately he became a clearly glandered subject. The animal was destroyed because it would never have done to have kept him in such a condition in dairy stock where milk was being handled. The disease again for another twenty years entirely disappeared. How on earth on the germ theory could that be explained as having come and gone with no possible contact with any diseased subject, in a district that was absolutely free from that disease ? That is the point I wish to impress upon you, The third outbreak occurred in the ordinary way. The animals were brought into the district, one from Edinburgh and one from Glasgow, and they not only themselves became diseased, but they conveyed it to their neighbours. There were three when tested with mallein reacted at once, and were put out. That ends my experience of glanders so far as Dundee is concerned, or as far as I am concerned. The most curious outbreak and the one most interesting to me, and probably also to you, is the second one, in which there was no possibility of tracing any contagion from any previous case, and in a district which was absolutely free from all possibility of contagion. With regard to the use of tuberculin, I quite agree with most of the remarks, indeed with practically all the remarks, that I have heard fall from the various speakers. I am at one with them with regard to the standardisation of tuberculin. To use tuberculin of such variable strength and with such variable results as have been spoken of is very misleading. I think that not only should the production of tuberculin be in the hands of one authorised individual, but it should be controlled from one centre, and not given to the public (Hear, hear). It is used by the public not only as a means of diagnosing the disease, but I know from practical experience that it is used for the purpose of deception, and for misleading and confusing the test when it comes to be legitimately employed (Hear, hear). In regard to the interference with the milk supply, probably the interference with the milk supply is about as great in a much more harmless way. For instance, when you go to examine a dairy herd you will perhaps go in at an inconvenient time and examine the animals, and the dairyman afterwards, or the farmer, or whoever he may be, goes to get his usual supply of milk and finds himself perhaps 50 per cent. short, due to nothing else but the disturbance of the animals. I have known a very serious complaint made because the cows were examined at such a time as to interfere with their feeding and digestion, and thus with the production of the milk. It becomes therefore a very serious question when you are to make your examination as far as cows are concerned, although of course it matters little as far as the examination itself is concerned.

I have seen such an increase of temperature as Mr. Gooch refers to. Quite recently I had a case in which the temperature rose from a little over 101 to something over 107. With these remarks allow me to thank Mr. Villar for his very excellent paper. Before I sit down I should like to ask Mr. Malcolm with regard to that cow or bull that was tested at Birmingham and passed in the first instance and did not pass in the second.

Mr. MALCOLM: It was the other way round. It was rejected in Birmingham and passed in Ireland.

Mr. A. RENFREW: Coming from the country I have very little to do with glanders, indeed in seventeen years I have only seen one case of glanders, and that case will probably help to clear up the difficulty of our friend from Dundee with reference to the solitary case in his practice. This case occurred on the place of a man who lived a mile and a half from where I practise. For years he has taken in all the circus and show horses that come round, as well as the horses of gypsies visiting our part of Worcestershire. The police there are very particular, and these people must go into a field. It was as much as nine or ten months after these gypsies had been turned out into this field that my attention was called to this individual case. It was unquestionably a case of glanders, starting with the farcy form, and it is the only case I have seen in my practice, as I say, in seventeen years.

We have a good deal of tuberculosis. I should like very much if Mr. Malcolm, or any other gentlemen here who knows more about it than I do, will give me a little information. First of all as to the testing of cattle, particularly with reference to the housing of them. A fortnight ago I examined 27 cattle, and, as I have previously done, I had these cattle brought in. But for the last nine or ten months any that I have done have been standing in the house. These cattle have been out night and day for some considerable time. The owner is a gentleman who sends his milk into the town twice a day; he has the animals milked at 4 o'clock in the morning and again at 1 o'clock in the afternoon. I tested the cattle at 9 o'clock at night. I injected them then and took the temperatures, and according to my usual custom I had the cattle kept in. They had been living in some very good fields, and naturally when asked to eat dry hay or anything of a dry nature they did not like it. The result was that they stood and looked at each other during the night and bellowed a good deal. To my mind these cattle were very much more upset than if they had been allowed to go into the grazing field. So much was I annoyed with the way they acted during that period, that last week, when I had another lot of 35 to do, I allowed them to be turned out as usual, and not only had the farmer a very much less decrease in the quantity of milk, but I am quite sure that I had a more satisfactory reaction. I should like to ask Mr. Villar how soon after making one testing anyone would be justified in making a second with confidence—how many weeks, three four or five weeks? I have been doing a great deal of this testing lately for dairy people, a great many of whom send their milk to London, and naturally they test their cows. I have nothing to do, perhaps unfortunately, with the reactors, but I do know that these reactors have been placed upon the market. The people buying in buy on the condition that that cow will not react for five weeks subsequently. He has to pay more for his cow, but he says that it is better as a means of keeping his stock clear. He has often to pay £1 more for the cow, but he gets the guarantee that that cow will not react to the tuberculin test at the end of five weeks, and as far as I can see that system is working very well. In making the test I have broken several needles, like Mr. Lloyd. I did not have a fresh needle made. One needle that was broken about 1 in. from the holder I ground up. I got an ordinary carpenter's fine bradawl and filed it down to fit the end into which the nozzle goes—a slip-in nozzle, not a screw—and since I have been using that I have had no trouble. I think the breaking of the needle is due not so much to the fact that the animal moves, but with such a little thing to hold by, your hand cannot move with the animal. If you have the little bradawl you can pull out the skin of the neck and put the hand at the back of the neck of the animal, and if the animal moves your hand moves with it. I have had no trouble with that. With reference to the standard, I have always used one tuberculin, and I think it is better to stick to one. Being a supporter of home industries I have always had my tuberculin from Sir John M'Fadyean. With reference to the nodules in udders, I notice by the new Bill—perhaps it is a good thing—that you are not allowed to apply the test at the present moment. It is a very difficult matter to me, and I do not know how, as an inspector, I am to decide, if I am asked to do so, that an animal has or has not a tuberculous udder. In the Bill it is said the inspector might use the test by permission of the owner. I do not see how, from a nodule in the udder in which there is no running, I am to satisfy myself. I cannot microscopically examine any exudation and therefore I am in a difficulty, and I should like the opinion of Mr. Villar or Mr. Malcolm on that point.

I also have to thank Mr. Villar for his excellent paper.

Mr. J. CAMERON: Like others I feel greatly indebted to the essayist for his able paper on the subject, but there is another aspect in regard, not only to that paper, but to all the papers I should like to mention, and that is the prompt manner in which they have been furnished to us, thereby dispensing with the questionable procedure of trusting to reading them in a railway carriage. It is not fair, I think, to the essayists to read papers in railway carriages.

Regarding my experience on these subjects, I have been forty years at Berwick-on-Tweed and have only seen two cases of glanders, and they were both sent down from London. With regard to tuberculin—one swallow does not make a summer, and therefore I have not enough experience on the subject, but so far as my small experience goes in connection with the curative effects of tuberculin, I should certainly say there are hopeful reasons to make us persevere and give it a greater trial on its curative side.

Mr. Blake: The paper which we have had before us is full of most interesting matter for us all, and I am afraid my remarks can only apply to the experience I have had abroad, which is probably not in accordance with the usages in this country. I notice in the first place that the essayist speaks of tuberculin in hermetically sealed tubes being safe to use for a year. Some couple of months ago a member of the Army Veterinary Service was discussing with me the length of time we could trust tuberculin in a hot climate, that is to say, a climate with an average temperature of anything from 75 to 100 degs. He had tested a lot of transport bullocks with some tuberculin that had been sent to him and he found none of them reacting. From his clinical observation he was not satisfied, and obtained another lot of tuberculin, from which he found a very considerable proportion of them reacting. I should like to ask Mr. Villar whether he would consider that we can trust tuberculin, or mallein for that matter, in a climate of that kind, and if so for what period. Personally, I have always got my tuberculin from the Royal Veterinary College, and I have always found it very safe and in accordance, practically, with post-mortem results. The cattle that I have tested have all been working animals, animals receiving a very liberal diet and performing very hard work, quite as hard work as heavily worked cart-horses in this country. I first of all had a tremendous lot of bugbears such as Mr. Malcolm finds—doubtful reactions. I could not make it out, and I then tried taking the temperatures of the working animals before testing. Some of these animals, although apparently perfectly heathy, working well, would give a temperature of 105 and even 106, and the next morning they would have dropped to perfectly normal. I then tried those animals who were not working animals, cows which had been brought in for slaughter. I did not find there was such a great variation in temperature, and therefore I came to the conclusion that for working animals receiving a very liberal diet, suddenly stopped from work and made ready to submit to the tuberculin test, to get a reliable reaction you would have to give them a dose of purgative medicine first. This I have always done since, and it has given, I think, reliable results. I am glad to hear other members of the profession speaking against the fine needles. I thought it was either due to my clumsiness, or the particularly thick skin of Burmese bullocks which made all the fine needles break in my hands. I had some very large needles made for myself. With regard to the character of the swelling in glanders, I differ somewhat from the essayist that the thermal reaction was not of very great value. In the only cases I have seen—I had last year 68 outbreaks of glanders—the difficulty I experienced was in deciding between glanders and epizootic lymphangitis. I have noticed in cases of epizootic lymphangitis which have been tested with mallein that you get a very similar swelling to what you get in glanders, and it is really only in the temperature that one can make the distinction. The swelling is not quite similar to that of glanders, but you get a very marked swelling there, and one which remains for several days. In epizootic lymphangitis you do not get much rise in temperature, and therefore you have to rely very much on the temperature to decide between those two diseases. With regard to the temperature following the use of tuberculin, I agree with several of the gentlemen who have spoken, that it is necessary to take the temperature in suspected cases at the 21st and even possibly at the 24th hour. At the 18th hour I have had many cases where the temperature has gone up to over 104 and 105 between the times. I have been always rather sceptical, because in Burma we find the temperature rising and falling so rapidly. I was interested to hear Mr. Gooch mention the temperature rising to 107, because I have had very many that have gone to that height. I thank the essayist for giving us such a large amount of food for thought as he has done in this paper, food that will last us for some considerable time.

Prof. WILLIAMS (Cornell University, Ithaca, N.Y., U.S.A.): I have been very interested in this discussion to hear that British veterinary surgeons are confronted with very similar problems to what we have in the United States. In reference to tuberculin it has been a very great problem with us that a great deal of the serum which is put out by the commercial houses has been found to be very unreliable. Our Government, however, have been rather liberal towards the veterinary profession, and the Department of Agriculture has furnished us constantly with a very good quality of tuberculin, and for a very long time furnished it absolutely free. Some of the States have taken up the work also, and in our own State of New York the Veterinary College makes nearly all the tuberculin used in that State, and it is sent out to any veterinary surgeon who may apply for it, at a mere nominal price to cover transportation. It is made without any view to revenue, and is presumably what we may call as nearly as possible a standard quality. That tuberculin has been found very satisfactory to the veterinarians of the States. As I say, other States have dealt with the matter in the same way, so that in a number of our States now the State Govenment itself, through some reliable agency, is making tuberculin and furnishing it to the veterinary surgeons who may desire to use it, at a purely nominal price, if not free. I have been interested also to see that you have to deal with what we might term "artificial preparation" in the handling of tuberculin and mallein. We have that to a very large degree, but whether any more than you have I do not know. I do know this, that the fact has to be recognised that we cannot tell upon testing an animal with tuberculin or mallein that the animal is not affected with the disease; that is to say, we cannot know whether that animal has been prepared artificially for the test or not. A great many large dealers know the action of these substances, and are using them quite freely. In our country we are supplementing the mallein test very largely by the agglutination test, and in that we have a test which cannot be masked by repeated injection of mallein. Nevertheless, there is harm being done with these very useful agents—the greatest diagnostic agents really we have ever known—because in many cases they have been used to the detriment of live stock owners, and to the detriment of the good name of the veterinary profession. We had a very illustrative case only a short time ago in the Clinic at our College. An animal entered without a history, except that it had been petted a great deal by the family, and was thought a great deal of in a certain kind of way. It showed no external symptoms of anything very interesting, but it was very stiff and had a high temperature; it was so stiff in its spinal column that it looked as though it had a steel rod running through the spinal canal. When it attempted to turn it pivotted on its hind feet; it could not turn its head to the right or to the left or put it up or down. There was no external mark of any disease which would lead one to any conclusion. We were in a locality such as some of you have mentioned where we do not know much about glanders; it is only very rarely we see a case at all, and when it does come, comes somewhere from the other large cities. As I say, we had no history of this animal at the time, but fortunately we suspected from its stiffness and its high temperature that it might be a case of glanders. Consequently it was tested with mallein, and it reacted. The agglutination test was applied, and again it reacted. The animal was then destroyed, and we found glanders lesions in plenty in the lungs and also glanders lesions in the meninges and spinal cord. Upon enquiry we found that this animal had been recently bought from a dealer and that the dealer had purchased the horse in the City of New York. There is an illustration of the difficulty under which we all work. An animal comes to us without any history, showing symptoms which to say the least are not negative of the nature of the disease, and yet it is almost certain that the animal had been tested either with mallein or with the agglutination test in the city of New York, and has been sold by the owner under the full knowledge that the animal had glanders, and he did not wish it to break down and show the physical signs of the disease in his hands. We have that hazard upon all sides, and we are trying to overcome it in our country. A recent law, which I do not believe will work, has been passed by the Legislature of the State of New York requiring that when a man uses tuberculin he must state how much he bought and where he got it, upon what animals he used it, and that information he must file with a Central Authority. Another thing about the law is that anyone engaged in the sale of tuberculin or the manufacture of tuberculin must report to the Central Authority, the Commissioner of Agriculture, how much tuberculin he sells and to whom he sells it. But the Post Office can carry across our State, and any man can go outside and buy all the tuberculin he wishes and apply it as he likes, and if it is never found out he is never punished for it—and there is really no way by which he can be found out. I am very much interested to see that you have the same problem to deal with that we have, and I wish that you could point out some clear method by which some of these difficulties might be avoided. We should certainly like to have some way of overcoming the dangers that front us on every hand with these substances.

Mr. G. A. BANHAM: Did I understand Prof. Williams to say that he found the lesion of glanders in the spinal cord?

Prof. WILLIAMS: In the meninges and the cervical spinal cord.

Mr. BANHAM: Do you mind describing what the lesion was?

Prof. WILLIAMS: They were the glanders nodules—glanders lesions, with intense inflammation of the meninges.

Mr. S. H. SLOCOCK: I wish to thank Mr. Villar for bringing this very important subject before us to-day in his usual able manner. I should like to express my belief in the use of mallein and tuberculin, and I would emphasize that by drawing your attention to the words of Sir John M'Fadyean as quoted by Mr. Villar, that the tuberculin test for tuberculosis in cattle is, when properly carried out, one of quite remarkable accuracy (Hear, hear). I think the same words apply to mallein, and I have such faith in both these tests that I would endorse the words used by Prof. Dewar, when he said that in a case where there was a definite reaction which was not confirmed on post-mortem the fault is with ourselves and not with the serum. Quite early in the paper, in a paragraph speaking of the composition and preparation of the serum, Mr. Villar says we can use it with the certain knowledge that it will produce no permanent ill effect upon the animal. I have had some very considerable experience in the use of both mallein and tuberculin, mallein in particular, and I should like to say that I have never seen any ill effect, but I have many a time seen the contrary. We have had a horse with a gland, and we have suspected glanders and have given a dose of mallein, and he has cleared up and gone on; the glanders simply disappeared in the most marvellous way within a week. I have seen that occur on many occasions. As to the standard strength of mallein and tuberculin, I think we shall all be agreed that if that could be brought about it would be for the benefit of all. I should like to see our Government adopting the system suggested by Dr. Williams, of making it and issuing it to those officially engaged in the tracing of these diseases, for then we should all be using one tuberculin throughout the country (Hear, hear). I notice that Mr. Villar says cattle should be tested in the sheds, and horses may be tested at grass. I cannot see where the distinction comes in about the two. It may be in some cases they are more difficult to get at, but that surely depends on the conditions. You would naturally rather test half-a-dozen dairy cows at grass than you would a couple of three-year-old colts. I do not agree with the tying up of horses at grass, because they are then under conditions which might excite them. My remarks will be confined more to mallein than to tuberculin, not because I have had more experience with one than the other, but because just at the present time I have been a good deal off tuberculin; I have only tested just those particular animals that I have been called upon to test. As for general testing with the idea of giving a man some indication of the state of his herd, I have generally shuffled with the question in advising him to do so. I think that, with the present condition of legislation, we often put ourselves into a very false position. We have something clear to go upon at present with the glandered horse, but we have nothing clear to go upon with tuberculosis. We have no Tuberculosis Order. We hope in the course of a while, when there is an Order, that we can advise our clients on what grounds they are having the work done. In the mallein test Mr. Villar gives the three usual reactions, and he does not seem to want to condemn a horse on one of them. Now in many cases I think we must condemn a horse on only one reaction. Mr. Villar seems to emphasise the local reactions. I believe to a very great extent in the thermal, and I condemn on the thermal reaction without a local reaction, and I have done so in very many cases, and in no single instance yet have I found myself in the wrong. I do not mean to say that I would not admit myself in the wrong, but, honestly, I have not been in the wrong. I have condemned horses on the local reaction without the thermal, but those local reactions have been reactions that have come up after twenty hours, and I have noticed them at the 21st hour. I have thought it fit to see them next day, and then I have got a most definite reaction. I can call to mind one case in particular in which we had not a degree rise in the temperature, but the local reaction was characteristic, and on post mortem I remember the glanders lesions were well marked. Mr. Villar gives us what I consider a splendid description of the local reactions, a description which it is worth any man's while to preserve. He quotes a case of a persistent swelling continuing after 40 hours which was not a case of glanders. I am curious as to what it could have been. Mr. Villar puts it down to a dirty needle, and I assume we must conclude he is right. On the question of the rise of two degrees in temperature, I think before we kill a horse we naturally want a rise of two degrees, but I do not think we can draw any hard and fast rule. If we are not quite decided in our own opinion as to whether a horse is glandered or not—we think he is—so that there shall be no mistake about it, we use mallein. In a case of that description I am content with the merest local reaction, and even with the advance in temperature of a degree or 1½° to decide to kill. I notice that Mr. Villar, quoting from Mr. Hunting, suggests 16 hours; Mr. Malcolm says from 12 to 15. It may look like a bit of impudence on my part to put my opinion against theirs, but I venture to say that those gentlemen will overlook a good many glandered horses if they are content with that one temperature taken at the 15th or 16th hour. I contend that if a man undertakes to test a horse, and if he is in the position of an inspector and it is a question whether that horse should be killed or not, he is doing justice to his country or an injustice to the owner of the horse. I contend a man should test the horse thoroughly, and unless a man tests a horse more thoroughly than that he does not do it thoroughly. Where you get a definite reaction at the 15th or 16th hour you are quite justified in killing, and you are not going to make a mistake, but the point I contend is that if you test only at that time and not at the previous or subsequent hours you are going to miss a glandered horse and going to give glanders a chance to spread. I agree with the hours set out by Mr. Villar. In my experience if you take the temperature from the 6th to the 9th hour you may get a rise. I do not think you are doing any useful work in the ordinary way by taking them before the 12th—you should take them at the 12th, the 18th, and the 25th hour, and those are the hours at which I have obtained the very best results. I do not quite agree with Mr. Malcolm. He is playing the very safe game of killing without making a mistake. But I contend the man put in the responsible position of inspector is allowed to make mistakes—the exception proves the rule. I do not think if a man makes a mistake once or twice he is going to get anybody in discredit. I must confess that once or twice I have played the game myself, but I have not hit on a wrong one yet. I have had a little gamble. I have not been exactly satisfied in my own mind, and for the sake of the community I have given the community the benefit of the doubt—not the horse, and it has always come out against the horse on post-mortem. The question of testing a horse with a temperature of over 102½° is a thing that gives us a little consideration at times. We are called in officially to test a horse that is in bad surroundings and in a bad state of health, and we have to hasten matters. I have hesitated to test that horse with a high temperature, but I do not as a rule give him more than 24 hours to get his temperature down. If it is not down in the 24 hours I generally test, and rely on the local reaction alone. I am only satisfied to dismiss a horse for not reacting. I agree with Mr. Villar that the drop of 2 degs. within 24 hours is always a very suspicious thing, and I also agree that there are cases of advanced disease in which you will get no reaction.

With regard to the tolerance of the test, I have found horses sometimes that will cease to react to the test, but those cases in my experience have been rather rare. I have had several horses under observation that to my knowledge have been reactors for upwards of two years, and I remember Mr. Hunting being present at a post-mortem on one horse that to our knowledge had been a distinct reactor for upwards of two years, and showed lesions that I do not think Mr. Hunting considered of any definite age; they would have passed as recent without a history. I have had a horse in my own stable and worked him when his neck was not too sore. I kept him with the idea that I could cure him with mallein, and I would see how far he could tolerate mallein. I had him for something like six months, and I should think on an average that horse had mallein once a fortnight, and he never ceased to react the whole time I had him. I had him killed thinking I had had him long enough, and the horse was undoubtedly glandered. That is about all I have to say of mallein as a curative, beyond recording a case in which I believe the first dose of mallein that ever came into the country was injected into a horse. The animal went on and did work for ten or eleven years, and unfortunately died in London from a twisted gut. I was watching him, and anxious to have his lungs at the finish, but he was sent away to one of the knacker's yards and we never heard anything more of it. I can only conclude he was not glandered or he would have been traced back. As a prophylactic, I am a strong believer in mallein. I believe absolutely that it prevents the spread of glanders. I have had considerable experience in stables in which glanders has had a home for many years: I have tested these horses every three months until I have cleared them, and we have had cases in which we have had a new glandered horse introduced into an old stable and have never had cases occur from it amongst the horses that had been already malleined.

I think in many cases we get the systemic reaction in tuberculin very early marked, more particularly in milking cows. I believe that the most reliable hours are the 12th, 15th and 18th, and I agree that the 21st is in many cases very important.

On the motion of Mr. Gooch, seconded Mr. Renfrew, the further discussion was adjourned to the afternoon session.

AFTERNOON SITTING.

The discussion on Mr. Villar's paper was resumed, Mr. R. ROBERTS occupying the Chair in the absence of the President.

The CHAIRMAN: Our esteemed President is not able to preside this afternoon. In the first place he is rather indisposed from the heavy duties he has had, and also a good deal of his time will be taken up in preparing for the further duties that devolve upon him this evening. I have therefore consented to take the Chair for him. I know the difficult position in which I was placed last year, and my good friend Mr. James Simpson helped me out in a similar way, and just as Mr. Simpson helped me last year I am trying to help our President this year.

The first thing is to resume the discussion that was abruptly closed before lunch when several gentleman were prepared to discuss Mr. Villar's paper. I should like to take this opportunity of saying that I think it is a most excellent paper: I have never read one quite so terse, so clear, and so well composed for presentation to our Association. I have read much longer papers, but I do not think I have ever read one that is quite so well to the point as this. A proof of that to me is the general consensus of opinion; everyone who has got up to speak has said that they agreed in the main with Mr. Villar. That shows that it is a quite up-to-date paper, and that it contains a great deal worthy of discussion. We have not had any fresh suggestions laid before us, and I take that as supporting what I have said, and also as a great compliment to Mr. Villar.

Mr. T. A. DOUGLAS: I wish to add my word of praise for the very excellent paper. Being in a country district I have not very much experience of the mallein test, but I have considerable experience of the tuberculin test. I was very much struck with Mr. Villar's mention of the fact that tuberculin could be obtained which gave 50 per cent. more reactions than another tuberculin. We have heard great complaints with regard to the reliability of the tuberculin test, and I should like to add my opinion with regard to that reliability; and that is, that if cows are tested carefully in their usual surroundings the test is reliable. I do not think it is advisable to test cows at all going out. I have always used tuberculin with unfailing positive results one way or the other. I recently had an opportunity of getting a cow which gave a definite reaction at the place where she was supplying the family of a gentleman. I then took her to my own home and tested her, kept her for nine weeks and tested her once or twice every week, giving her a half dose and a double dose, and she reacted every time. As far as she was concerned, at any rate, the repeated test did not do any good. With regard to the time of testing, I like to see them before the 12th hour and before the 18th. If there is any rise in temperature at the 18th, it is certainly advisable to see them again at the 21st or later; but if we have no alteration in temperature at all at the 18th I do not think that is necessary.

Mr. F. G. SAMSON: I would also like to add my testimony and thanks to Mr. Villar for so good a paper. With regard to using mallein and tuberculin, I think, seeing the cheap price at which we are able to obtain it, it is always well to have it fresh. I invariably have it in small quantities; I just get sufficient, and I do not use it a second time. Being close to London I can get it easily, but if one is not close to London it is very simple to send to the College enclosing the stamps, you will get the mallein by return of post, and you can depend upon it being all alike, and thoroughly good. We should not run the risk of using any that is stale.

With regard to the use of a syringe, there is a great deal in that. I do not like a syringe with a sheath to it. Some speaker this morning said he did, but I find you cannot get it into the skin so well. I find a very fine sharp needle is best, with a bayonet top; you can slip it into the skin and put the syringe in afterwards, and in that way you will break very few.

With regard to the time of testing, we have to study sometimes our clients' convenience. There are more horses tested on a Saturday night and Sunday than on all the other days of the week together. One requires to be very sure that the horses which you test have been in the stable for some time. In some firms the horses arrive home rather late on Saturday evening, and it is just as well to leave the late ones until the next Saturday night. I would not think of testing any horse that had not been in the stable at least four or five hours, because I do not think the test would be found correct. I like them perfectly cool and settled down. There is no doubt that if horses are in the stable for eight hours and kept dry and quiet, you will get much better results. Mr. Villar said something about testing them outside under a tree, and I can quite understand why he said that. It would apply to cases on marshy ground, or to horses turned out and not very easily got in; it would be a matter of either doing it there or not doing it at all. I presume he would only do it outdoors when he could not very well get the animals under cover. Prof. Williams has mentioned that the sale of tuberculin and mallein is controlled in New York, but that that did not stop it being bought from other places and brought into the State. Control of that sort is no use at all. It would be a very fit and proper thing if we could impress upon our Government the necessity of controlling the substance in this country. I have no doubt that when this Association is reorganised, and we get fixed up into the same position as the British Medical Association, we shall be able to bring some influence to bear, but I do not think it is likely we shall do it before. It behoves us to go on with our Association and get combined action. There is one point in the paper to which we should pay the most particular attention. On page 104 we are told that when we go to inject horses and find the temperature is above normal, we should wait until the temperature has gone down. In some cases you might wait, but it would not go down. In the case of long standing glanders I think it would be more likely to keep up. In a case of that sort, where there are a few suspicious clinical symptoms, it would be just as well to give a dose and a half and go right on with it. The point I wish to draw attention to chiefly is that when you inject and the temperature is above normal, at the 12th hour the temperature goes down, and we ought to pay most particular regard to that and go on to the 16th and 24th hours, because the first time we could not obtain any definite results at all. In those cases also we should pay special attention to the local swellings. For my part I believe more in the local swelling than I do in the temperature. If you get a horse with a swelling 5 in. or 6 in. longitudinally and 3 in. to 3½ in. across, and that swelling comes up the second or third day and lasts until the fourth, and if when you go to touch it the animal moves, you can lay 1000 to 1 on it he is a glandered horse. Without any temperature at all, I should kill him at once.

Mr. W. HUNTING: I think I ought to say something on Mr. Villar's paper; everybody apparently compliments him, and I agree with the President that it is about the most lucid and concise paper that I have come across on the subject, and I agree with nearly every word of it. A number of speakers have alluded to different things, some in the paper and some not, and I have, during the course of the discussion, made a few notes just to give you my own experience. First, about the best kind of needle. I cannot for the life of me understand a man using a big, thick needle. The horse gets awkward, and you are very likely to break the needle or let it fall. Very few horses pay much attention to a thin needle, but it must not be a long one or it will bend or break off at the neck. A short, thin needle is in my experience by far the best. I suppose nobody now uses a syringe that has to be screwed into the needle; you want to plunge your needle in and then, with a plug fitting, your syringe is put in, and the thing is done at once. I got a tip from one of my colleagues which I will give you, because I think it is a very useful one. You have only two hands, and to get the needle in and hold the skin and hold the syringe all at the same time is a thing not easy to do; but it is extremely easy to do it in this way. You who smoke cigars know that if you put a cigar between the second and third finger you cannot lose it. Put your syringe without the needle on it between those two fingers, and the rest of your hand is at liberty for anything you like. You can have three horsekeepers turning the horses round for you as you go along, when you have a number of horses, and you just walk from one horse to another and mallein them. If you carry the syringe between your two fingers—in the middle of the hand—you can raise the skin up with the left hand, plunge the needle in with the finger and thumb of the right, and then the squirt is ready for action. It saves a lot of time. I think there are some rather superfluous regulations, swabbing the skin and disinfecting it, for instance, I look on as an absolute waste of time. In the thousands of horses that have been malleined in London, those I have heard of and seen, I have only known one local abscess as the result, and I have myself used the same syringe for the last twelve months, and I have never washed it out, never disinfected it, never put it through a lamp, and I have never had anything wrong with the skin. As to the times for observation of reaction, there is a regulation in force now requiring horses going to Ireland to be malleined, and I believe the chart has about five or six observations to be filled in, but I do not believe that anything more than three observations are necessary. You want the temperature at the time you inject, the temperature at the 15th or 16th hour, and again at the 24th—perhaps the 20th would be as well if it were not for the local swelling. You do not want to go and look at the local swelling until you are obliged to, and 24 hours ought to elapse before you take any notice of the local swelling. Then there are the cases of deferred swelling. There is none for the first 24 hours, then it commences, and reaches its maximum at 48, or even a little later. Those have to be borne in mind, because it does not do to free a stud until you are sure that you are not going to have your swelling on the second day instead of the first. Then we come to the various reactions obtained; they vary immensely, and I am inclined to think that 10 per cent. of the horses you inject that are really glandered give you an indefinite reaction, quite 10 per cent. There are various forms of indefinite reactions. One which has been mentioned to-day I should never act upon, and that is the local swelling without any rise of temperature. I am not sure that I have ever seen a case of that kind, and I certainly should not venture to kill the horse without any rise of temperature. There are cases where you have a rise of temperature and no local swelling; they are not very common, but I remember one very distinctly, an old roan mare, which, I think, from my negligence in leaving it the first time because there was no local swelling, infected five or six more horses. The second time that mare was injected no local swelling occurred, and—I am almost ashamed to say this, because it is an illustration of negligence and carelessness—I went along the stable, paid no attention to those who had no local swelling, and passed the roan mare. She looked so nasty, however, that I said to the owner I would go back and have another look at her. I took her temperature—it was the 24th hour—and she was 105. We killed her, and without a particle of local swelling it was one of the worst cases of glanders you could possibly see. Then there is the small local swelling, a swelling which varies from 3 inches downwards. Some of these are rather puzzling. You get a local swelling measuring perhaps 2 inches across and running down to 6-in. I think the vertical measurement of the swelling is absolutely misleading. A man writes and asks what you think of a swelling 2 in. by 6 in.; you are not quite sure which measurement comes first—it might be 6 in. by 2 in., and that makes all the difference. The swelling, if it were 6 in. across, would be certainly very definite, but 6 in. long, or any length you like, has nothing whatever to do with it. It is the width of the swelling you have to consider. Under the present Order the small local swellings and indefinite reactions of all kinds have to be tested again, and they say tested within 12 days. I suppose they must put some date in, for fear of a difference of opinion with the client, but I myself think that the 12 days is almost too short a period, although I do not mean to say that a glandered horse will not react in four or five days; I have known a horse react a second time, and well react, with the swelling of the first injection on the other side of his neck. The present Order also says that when you have tried him the second time, if you do not get a positive reaction you must release that horse. Now, if we have another Order there is one thing that certainly ought to be put in, and that is that there should be a compulsory second test of the whole stud. Just as with the tuberculin experience with cattle, so with glanders: you never have a large outbreak in which you can detect the whole of them the first time you go round. You go through a stud of 100 horses in which you can pick out fifteen, and you have five or ten indefinite reactions. All you can do is to wait a fortnight or month and try those indefinite reactions. Then my experience is that perhaps two or three months after, you get a clinical case amongst them. You look up your list and find that horse passed the first test without a sign of reaction in any way. A week or two after that you will have another, and perhaps others. You go round a second time and you sometimes get nearly as many the second time as you did the first. In all the big studs that have been badly affected in London we have this experience, that the first test has not detected all the cases. Perhaps if I take a concrete case it will make it clearer. In one stable we had 160 horses. The first time we did half of them and got 30 reactors. Out of those 30, when we made a post-mortem six had ulcerated tracheas, and from the spot where those ulcerated treachea horses came from we have had ten or twelve cases since. The explanation I offer is that those horses with the ulcerated treacheas were infective animals—dangerously infective—and that any horse using the same water trough or manger, or standing next door to them, might have been infected at any time by them, and these other cases were infected by them, infected perhaps a day or two before we tested. It takes more than a day or two after infection to get a reaction from mallein. How long I do not know. Experiments of Nocard's show that you may have to go 21 days before you can get a reaction, and the experiments of Nocard and of Sir John M'Fadyean show that you may, after injection, get a reaction in eight or nine days. It would be safer with the natural infections to allow a period of at least a month before re-testing the stud.

Although I am inclined to think that mallein is nearly infallible, I am bound to confess it is not, that is to say you may have a perfectly good reaction in a horse and fail to find any glanders lesions in him afterwards. We have had in London in the last two years 4,000 or 5,000 horses tested, and the London County Council has had to pay for four or five full value because the inspector and the mallein combined killed the horse and failed to find any lesion of glanders whatever. Still, out of 4,000 say, four mistakes is not a heavy percentage of error, and I venture to think that you had far better kill even 1 per cent. of horses for which the Local Authority has to pay full value than miss one or two by not being severe enough in your reading of the reaction (Hear, hear). Why in the world you should have a good high temperature and a great big swelling and then find no lesions, I do not know. I cannot explain it at all. Possibly there is in that animal somewhere a glanders lesion that we did not find, but I may say that in those cases we look pretty well over them, because very often another veterinary surgeon appears for the owner, and you have to find a nodule if you can. You find all sorts of nodules in lungs. The last case in which I made a mistake, if it was a mistake, had about four or five calcareous nodules in the two lungs. The owner was a veterinary surgeon, and quite rightly said he did not call it glanders, and I suggested that he should send the lungs to the Board of Agriculture, because their decision is final. Out of compliment to me he said he would not dispute it, and we agreed for our mutual satisfaction to send these nodules to Sir John M'Fadyean, and ask him if he could find any active bacilli, and he failed to find any active bacilli in those nodules. It is a question in my mind whether you cannot have a mallein reaction for some little time after all the bacilli are dead, but that I do not know. Then in some cases of farcy you find no lung lesion whatever. Of course, you have the local symptoms of the farcy to go upon, and if there is any dispute about it they would no doubt find the bacilli in the farcy discharges, or in some of the unopened buds, but it is a fact that occasionally—what percentage I can hardly say, perhaps 1 per cent. of cases—you have no lung lesion whatever. Those cases I look upon as due to direct inoculation into the spot where you find the farcy in the leg. I have no doubt, too, that many horses have been killed before the days of mallein as suffering from farcy which were not afflicted with that disease at all. When we get a doubtful case of farcy we give it a dose of mallein, and that often helps. If you have a first class reaction there can be no doubt about it. Sometimes you get a case where you have little enlargements down the leg which you might think were farcy buds, or you would have thought so a few years ago, and you get no reaction. Sometimes I have been almost inclined to say that I know the mallein was wrong, because I was sure it was a case of farcy. When we killed him it was not. Therefore, I do not set up my opinion against that of mallein when I get a really good reaction. In a case of so-called ulcerative lymphangitis I do not believe any man, without the use of mallein, could make a safe diagnosis. I have seen within the last two years five cases of this ulcerative lymphangitis, and the only thing I think ought to help us clinically is the fact that in these cases you have nearly always a large ulcerative patch, not like the ulcer of farcy, but a deep slough, a piece of skin sloughed out perhaps 2 in. by 1½ in. It first starts inside the thigh, pretty high up, a nasty ragged sore. From that you will have enlarged lymphatics, and down the legs buds one after the other. We thought it was a case of farcy, but it was not. All that the bacteriologists who examined the cases found was one of the pus cocci.

There is a question about the effect of the repeated tests with mallein. I am not myself inclined to think that a horse really ceases to react to mallein if he has got any active bacilli in his system. What you call a ceased reactor I believe is not infective or dangerous to other horses at all. But if you have given a test of mallein once a week to a horse that has reacted—that is to say, he was a glandered horse and you went on repeating the test—you do arrive at a time when the reaction becomes very much less; in fact, one or two injections of mallein when you try him again will very often give you a temperature not exceeding 102 degs., and the swelling also decreases in size, though it generally remains painful, and I set a great deal of store by that painfulness. If a horse, after being tested week by week and giving reactions, gradually less, is allowed to go without a dose of mallein for a month, or better still for three months, and then he does not react, I should certainly have no hesitation in saying that that horse had no active bacilli in his system. Unless in a very bad case of glanders, where the lungs are full of nodules, I do not think you have very much falling off in the reaction even if you test every week. I have experience of one horse that was tested once a month for six months, then once a week for three months, and every injection gave as good a reaction as the first one. In those cases of ceased reactors, when you come to make a post mortem you will find nodules in the lungs just the same in appearance as the nodules in an ordinary case of glanders, but when a bacteriologist has done his best, by injecting into guinea pigs and by growths on potatoes, etc., he will tell you he finds no active bacilli there; so that the mere appearance of glanders lesions in the lung is not positive evidence at any rate of the existence of active bacilli. That would be determined only by a bacteriological examination.

Mr. G. A. BANHAM: There is one point of which Mr. Hunting has spoken in connection with the diagnosis of this disease which is very important to us all, especially to those gentlemen who are inspectors under the Board of Agriculture Order, that is to say, where animals react and we find no nodular lesions in the lung. I have had more than one case on my hands where I can find no nodular lesions, but I have found a mottled appearance of the lungs, and I have never seen this mottled appearance in any other condition. I have spoken to one or two gentlemen on this point and they have found the same. Personally I look upon it as an absolutely diagnostic symptom of glanders, and if I ever test a horse and he reacts, although I do not find any nodular lesions after death, but find this mottled appearance, I put it down to glanders. I think it is due to capillary congestion. The lungs feel somewhat firmer than they otherwise would do, but one does not find anything else except this mottled appearance. It looks to the naked eye something like a liver cut across, and personally I look upon it as a diagnostic lesion of glanders. I should like to ask Mr. Hunting or Mr. Villar to give us their opinion on this point, because I think it is a very important one. Mr. Hunting also suggested a time-saving way of holding a syringe and I think it is a very good one, but there is something else which is time-saving, a thermometer with a bulb at the end, whereby you can tie a piece of string round it. You can put a dozen thermometers in the cows in the shed, tying them with a piece of tape round the tail, and you can take a hundred temperatures in one-third the time that you could with our English thermometers. I have asked the instrument makers to make me thermometers of this kind, but I have never yet been able to get them to do it for me. It is a German thermometer, but I do not see any reason why it should not be made in England.

REPLY.

Mr. S. VILLAR: In the first place I would like to thank the gentlemen present for the cordial reception they have given to my paper, and I would also desire to thank Mr. Malcolm for the very kindly way in which he opened the discussion upon it. Both he and the gentleman who immediately succeeded him pointed out that there was very little controversial matter in the paper, and I began to think there would not be much discussion, but there has been a good discussion, and I thank you for it.

The first point of Mr. Malcolm's remarks I wish to take is where he criticised the statement I made as to there being tuberculins on the market which will give at least 50 per cent. less reactions than the ordinary tuberculin. I do not hesitate for a moment in asserting that as a fact. I am confident of it because I have seen it myself on more than one occasion. Several gentlemen have alluded to this, and it seems to me that possibly if we brought forward some motion as to the necessity of creating, or getting the Board of Agriculture, or the Government, to create some standard of strength for tuberculin, coming from an important association such as this it might have some weight (Hear, hear), and cause the Government to take some step in the matter. Mr. Malcolm points out that I treat tuberculin only from the point of view of a diagnostic agent and not as a remedial agent. I did that purposely, because I think the data that we have to go upon, the knowledge we possess of any curative effect which tuberculin has, is very small. I do not think we should be justified with our present knowledge in relying upon it as a remedial agent. At all events nothing much is known as to its curative properties, and I think we can very well postpone discussing them until some future occasion. He speaks of intra-muscular injection. Well, it occurs to me that there is no necessity of having intramuscular injection either of tuberculin or mallein. The dose which we introduce is so small that it is not likely to produce any ill-effect by being put immediately under the skin. I know that in injecting large quantities of serum—anti-streptococcic serum and that sort of thing, large doses put beneath the skin sometimes result in sloughing of the skin, but there is no danger of such a thing occurring in the case of the small doses of mallein and tuberculin. Mr. Malcolm then spoke of using a trocar, and pointed out the fact that occasionally the skin adheres to the needle or trocar when attempts are made to pull it out: that is the very reason why I suggest the use of a small needle, if a small needle is used the skin does not adhere to it and you can draw it out without any trouble at all.

As to my statement that the mallein test may be relied upon to detect 99 cases out of 100 in the horse, I did not mean to say it would do that necessarily with the first dose, but I am confident that in using mallein with discretion, and in re-testing, in 99 horses out of 100 you get positive proof as to whether the horse is glandered or whether he is not. He said that Mr. Hunting stated horses had been condemned without any rise of temperature, and I quite agree with that, providing of course that the temperature is abnormal to start with. I have pointed out in my paper that in cases of abnormal temperature it is not at all unusual to find that the temperature does drop, and drop considerably, and in one case which I give—a horse with an initial temperature of 104°, the highest rise of temperature he had afterwards, (at the 18th hour) was only 103°. That horse was killed, and there was no doubt he was glandered.

As to temperature without swelling in an infected stud, I pointed out in my paper that I would not kill a horse on a rise of temperature alone—that I must have some swelling also, amounting to a local reaction, or I would not order an animal to be killed. But I pointed out that supposing the animal was a member of an infected stud, and he had a rise of temperature and also showed constitutional symptoms. I would advise the owner to kill it. I was careful to make use of the word "advise" and not "order," because with a rise of temperature alone I would not order a horse to be killed.

Mr. Malcolm spoke of glanders in Birmingham. Gentlemen have congratulated him upon the remarkable results he has obtained, and I should like to join in those congratulations, but I think we ought to extend our congratulations a little bit further: we ought to extend them to the Hon. Secretary of this Association, who in season and out of season has advocated the dealing by the authorities with in-contact horses (Hear, hear). The in-contact horses at Birmingham have been dealt with, and so the disease has been quickly exterminated from that city.

I have no other notes with reference to mallein, but in regard to tuberculin I quite agree with what Mr. Malcolm said—that the indefinite reactions are the difficulty. He advocates taking the temperature at the 9th hour, and with that I also quite agree, but one must think of one's own comfort. It is a very long business testing cattle and taking their temperatures from the 9th to the 21st hour; it necessitates sitting up at night and so on, and I do not think there is any need to do it in ordinary cases. Then he speaks of the sudden jumping up of temperatures—temperature which go as high as 104° very quickly, and quite quickly fall. I alluded to two of such cases in my paper, and I might mention that post mortem examinations were made of those animals, and in one case the animal was affected with pyæmic abscesses of the liver, and in the second animal there was some septic condition in connection with the uterus. It was in a cow that had only calved about three weeks.

I understood Mr. Malcolm to say he would make use of the tuberculin test in all cases where he suspected tubercular mastitis. I feel that the tuberculin test is misleading for the diagnosis of tubercular mastitis, except in the case of an apparently healthy animal. In such cases, if you tested the cow with tuberculin and she did not react, it would be proof positive that the mastitis she suffered from was not tubercular in character. I am quite in accord with what Mr. Lloyd has told us with reference to tuberculin. He has pointed out that the more reactors there are, the greater falling off there is in milk. There is no doubt about that. The animals which really do fall off remarkably in milk are the reactors, although I admit that healthy cows, owing to being disturbed and interfered with during the night and so on, fall off in their milk to some slight extent. The question he asks with reference to mallein has been answered by Mr. Hunting, who has pointed out that in some cases there is a reaction to mallein, and that he has met with cases where there has been reaction and on post mortem he has not found any symptoms of glanders. Mr. Lloyd asks me what are the first indications of the existence of glanders in the lungs.

Mr. Lloyd: What I was alluding to has been answered practically by what Mr. Banham has stated. I had noticed that peculiar liver-like condition of the lungs myself in four animals. After I had asked my question I entered into conversation with Mr. Banham and I found he had noticed the same thing. I was really trying to draw something from you on that point.

Mr. Villar: That enables me now to reply to Mr. Banham's criticism about this mottled appearance of the lung. To my mind the first post mortem symptom one finds of glanders in the lung is some small, almost circular, circumscribed hyperæmic patches, and that, I take it, is the condition which Mr. Banham alluded to.

Mr. Banham : I do not think they are hyperæmic patches, because the hyperæmia seems to be circular brown patches giving this mottled appearance. It is not a small hæmorrhage but an incomplete circle, not distinct to the eye; it is simply a mottling. It strikes me as being merely the capillaries congested, throwing up the tissue between the capillaries as a kind of brownish colour.

Mr. Villar : Would it be what one hears described as glanders pneumonia ? At any rate that is my opinion of the first indication we may find of glanders existing in the lung. It is a circumscribed patch usually, almost circular, of hyperæmic tissue.

The Chairman: A hæmorrhage.

Mr. Villar : It is a hæmorrhage, and later on develops into the glanders nodule. Mr. Gooch asks whether I can give any reason why a mule should require a double dose of mallein. I do not know why it is, and I have never tested a mule with mallein, but Mr. Gooch, I expect, knows that the indications of glanders in the mule are not precisely similar to what they are in the horse. The disease itself seems to take a somewhat different course in that animal from what it does in the horse, so that possibly there is need for an additional dose of mallein to produce the same effect. With regard to tuberculin, he asks me the highest rise of temperature from the normal which I have had, and himself instances a case where he had an animal's temperature rose from just above normal over six degrees. I do not think there is anything very unusual in that, especially in young animals.

Prof. Dewar pointed out that the test on newly purchased animals which have been exposed in markets and fairs was not reliable. I only alluded to that because it shows what difficulty there would be in enforcing any rule or Order for the compulsory use of the tuberculin test. He recommends the use of the microscope in tubercular mastitis. Supposing one is called in to inspect an animal suspected of tubercular mastitis, the right thing, of course, is to examine its milk, and in most cases we get a satisfactory result as to whether it is tubercular mastitis or not.

Mr. Spreull gave us some very interesting details as to the existence of glanders in the district in which he resides, and he quoted one particular case where animals upon a farm became infected at an interval of twenty years, and mentioned that the second case, the one which occurred twenty years after the original outbreak, was a case of farcy, and wondered how it could have become infected. I have no doubt at all that when Mr. Spreull said no glanders existed in the neighbourhood he was positively sure that all the farmers' and neighbours' horses were free from the disease. But the very next gentleman who spoke pointed out a possible source of infection. Mr. Renfrew it was who spoke of gypsies' horses and show horses. That is where the danger comes in. I take it that in the district where Mr. Spreull resides he gets wandering gypsies and possibly circus horses. It is said that the only time glanders was found in Australia it was introduced by circus horses, and it is possible that this animal Mr. Spreull alluded to came in contact with an animal suffering from glanders in a forge, or pulled up outside an inn, or something of that kind.

Mr. SPREULL : That was quite impossible. There were no travelling circuses.

Mr. RENFREW: They pass along the public road.

Mr. VILLAR : Anyway, I take it that an animal, never mind where he is, does run a risk of getting infection in this way. In the case Mr. Spreull alludes to the animal was infected with farcy to begin with. Farcy may arise, as Mr. Hunting has pointed out, from the direct inoculation of some pre-existing wound on the skin with the infective material of glanders. Mr. Spreull says it is a single case, that there were no other animals in the stud that became infected, but I take it that during the period it was infected with farcy it was isolated, and really the resistance of horses to the infection of glanders is great. I do not think glanders itself is often spread from a case of farcy. To get glanders to spread you must, as Mr. Hunting pointed out just now, have ulceration, or at any rate open lesions, either in the trachea or the lungs. Mr. Renfrew spoke of housing cattle. He talked like a practical man, and I was surprised to hear one thing he said. He related a case in which some animals which he tested came in from grass and refused to eat dry hay in the shed, and became excited. I should have thought a man like Mr. Renfrew would have taken the precaution to have had some of that long grass cut and carted to the cattle. They would have settled down then all right.

Mr. RENFREW : Perhaps you will excuse me for saying that a month ago there was no grass to cut in my country. I do not know what country you might come from.

Mr. VILLAR : I understood you to say that they came out of a field where there was grass.

Mr. RENFREW : I said that those which I tested last week came out of a field where there was grass.

Mr. VILLAR: It has been pointed out in the paper, and we all know, that it is necessary to keep animals free from excitement. To take them off grass and put them on dry food is not a way to keep them from excitement. I should have postponed the operation for some time.

Mr. RENFREW: I was referring to the advice that the animals should be kept in in all cases.

Mr. VILLAR : My chief objection to turning them out is this. Supposing reactors are turned out to grass, they are very apt indeed to stand about, and will not move about to keep warm. When they are out to grass they get exposed to rain and winds, and quickly get chilled. I think under all circumstances, except in the case of very warm weather, one ought to ensure the animals having some kind of shelter.

I was very much interested in the points Mr. Blake mentioned. It was very interesting to find he had been using tuberculin and mallein on such an extensive scale in Burma, and the gentleman who immediately succeeded him, Dr. Williams, had also a large experience. Mr. Blake spoke of a local reaction in epizootic lymphangitis, and I gathered from him that it was the usual thing to get. I have only once tested an animal suffering from epizootic lymphangitis with mallein, and in that case we certainly got no reaction. By that means I was able to recognize that it was not farcy, but epizootic lymphangitis.

Mr. Slocock has considerable faith in the curative value of mallein. It is a very difficult thing to say really whether a certain medicine which is used does or does not really do any good. In the case where horses are treated medicinally by mallein they are of course put into good surroundings. They would not be worked, and probably would be fed on easily digestible food, so that the animal would be under favourable circumstances for recovery apart from the doses of mallein which may have been given.

I now pass on to the discussion this afternoon, and in the first place I wish to thank our Chairman for the very complimentary remarks he was good enough to make with reference to my paper. The case mentioned by Mr. Douglas was a most interesting one, and curiously enough Mr. Hunting spoke of a similar case in a horse to that which Mr Douglas had had in a cow—an animal which after repeated doses of mallein or tuberculin acquired no tolerance to the action of it. I take it that would be an extraordinary animal.* Of course, we well know that plenty of animals will in the course of time acquire any amount of tolerance to almost any drug you like to exhibit. I was rather surprised to understand Mr. Hunting to say that he would not kill on a local swelling without a rise of temperature after mallein, but I presume Mr. Hunting means he would not kill an animal having a normal temperature, or very nearly normal temperature, that had no rise, because undoubtedly animals which have high temperatures will get a local reaction without any rise of temperature and still be glandered. I think he was the first who spoke of the vertical swelling which sometimes follows an injection of mallein. I have mentioned it in my paper, because Mr. Porch, a gentleman who has had a large experience of mallein testing in London, pointed out that the vertical swelling, about seven inches long and two inches wide, on the neck, supervening on an injection of mallein, was of no importance as a diagnostic. Another gentleman in London, Mr. Charles Sheather, who has also had large experience of glanders, has pointed out that the probable explanation of that vertical swelling is that when the operator takes hold of the skin between his finger and thumb he produces some separation of the subcutaneous tissue, and so predisposed to an enlargement or swelling in that position and of that shape.

I do not think there are any other points which have been raised, but am afraid my reply to the criticisms has been very meagre. I have nothing further to say but to thank you for your very kind attention.

The CHAIRMAN: I am sure we are all extremely obliged to Mr. Villar. I am not going to say anything about the discussion of the paper. There may be one thing that arises from the paper, the question of private testing of cattle by owners or dealers. We might call it secret testing or surreptitious testing of cattle. It is of not much concern for the moment from where they get the tuberculin, but it is of great concern that when they find they have a reactor—and a bad one—they immediately place it upon the market, and it is sold to some innocent and unsuspecting person. I think that amounts to fraud, and I believe, in the law of our land, is fraud that is really criminal. We wish we could be protected from such doings, both as a profession and as representing the large public who drink the milk and eat the flesh of those animals that are sent broadcast in this way. I think after the revelations that have been made to-day in this room respecting tuberculin of various strengths and standards, and the use that is made of them, we ought to adopt some means to combat such fraud, and by and bye our Secretary will read to us a resolution which I hope this large assemblage of veterinary surgeons will pass and direct to be forwarded to the proper authorities. (Hear, hear). I have been asked in one particular case, "What tuberculin are you going to use?" I replied, "I always use one, and that is the one that I purchase from the Royal College of Veterinary Surgeons." They would not have that, but said I must have the one they supplied to me, and I declined to undertake the business. The use of such tuberculin opens a door for passing all animals, because they are able to say that they have passed through the test—but they have not. They have not had a proper test applied to them, but they can be sent on from this country to any of our Colonies, to America, or to any other place, and it can be said that they have passed through the test. That is a thing that gets for owners and sellers the bad name of sending animals which they say have been tested, but which have not been tested at all. I think we should do ourselves credit in passing this resolution this afternoon and in sending it to the proper authorities.

Mr. HUNTING: The resolution reads as follows: "That this Association desires to draw the attention of the Board of Agriculture to the fact that tuberculin is sold and used which fails in a large percentage of cases to produce a reaction in animals which are undoubtedly diseased, and recommends that some State control over all tuberculins should be enforced."

Mr. ———: Would it not be as well to include mallein in that resolution?

Mr. SIMPSON: There is no evidence that mallein fails.

The CHAIRMAN: Those who know more about it than I do say it ought to be included. I was not aware there was a spurious mallein put upon the market. If there is I think it ought to be included, and the Secretary will include it.

The resolution, as amended as follows, was carried unanimously:— "That this Association desires to draw the attention of the Board of Agriculture to the fact that brands of tuberculin and mallein are sold and used which fail in a large percentage of cases to produce a reaction in animals which are undoubtedly diseased, and recommends that some State control over both these agents should be enforced."

AUTO-POISONS,

By Henry Sumner, M.R.C.V.S.

In accepting the honour to prepare a minor paper for the meeting of the N.V.A., I made two serious mistakes, in that I presumed to write upon a subject which I find is enormous, and also in that I failed to realise that my time for such preparation was very limited. However, I trust that the epitome of the subject which I offer may be productive of interest and provoke what is the desire of all essayists, an animated discussion.

The term auto-poisoning or auto-intoxication is applied to those morbid conditions of animal life which are associated with the production of unusual organic compounds or extractives which simulate in composition some of the by-products of microbic activity, but remain yet to be accurately described, probably by reason of the fact that such compounds or extractives are numerous and their points of chemical difference small.

Not only do these bodies simulate the microbic by-products in composition, but in certain acute forms they offer to the clinician many of the expressions of constitutional disturbance which are associated with the better known microbic invasions.

As these bodies are the product of disturbed normal metabolism, it might help us to consider what is meant by that physiological process.

According to Hoblin, whom we may consider a reliable authority, metabolic force is a term applied by Swann to "the *force* or power possessed by living cells of *changing* the character of the substances which are brought into contact with them." Consequently, in health these bodies are kept under control and prevented from accumulating in the tissues in which they are formed, and where, probably, by their residence they undergo further changes and become infective principles.

In normal conditions these bodies—

(1) Are eliminated in the urine, fæces, etc.

(2) Enter into combination with other bodies, forming harmless compounds, or

(3) They become chemically altered into non-toxic or relatively innocuous bodies.

Therefore, when such normal processes are interfered with, these otherwise harmless bodies become operative at the expense of the animal's health, and such processes may be divided into—

(1) Defective elimination due to some disorder of the excretory organs.

(2) Failure of chemical neutralisation through disease or derangement of the organs responsible for such processes, *e.g.* liver disease.

(3) Failure in the chemical transformation of the metabolic products, resulting from abnormalities in the functional tissues, or through a checking of the normal steps of metabolism by the failure of elimination of the end products.

(4) Excessive formation of certain normal products of metabolism, *e.g.*, hyperactivity of the thyroid.

(5) Production of abnormal toxic chemical substances, *e.g.*, the intoxication following superficial burns.*

Many varied opinions have been expressed as to where the line should be drawn between auto-intoxication depending directly upon the retention of the altered metabolic products, and that associated with the reception into the animal economy of such bodies as ptomaines; but for our purposes we will consider only such expressions of animal diseases as may appear to be the result of the retention of the altered metabolic products.

The auto-intoxication may be acute, in which we have very manifest constitutional disturbance; or sub-acute, in which there is no appearance of disturbance but a condition of unthriftiness. The intoxication may be general, or confined to given areas. It affects almost every tissue of the body, and if acute is frequently associated with great disorganisation of the function of the nerve centres.

Susceptibility is not confined to genus, sex, or age; it is general, but more particularly encountered in the early periods of life, and is largely dependant upon errors in dietary, hygiene and exertion. Plethora, continued or transient, increases susceptibility, as also does anæmia.

Unlike microbic diseases, auto-intoxication recurs, and unless the animal is placed under more favourable conditions the attacks appear to increase in virulence.

Without attempting to go into the complexity and mystery of cell life and functions, it may be here remarked that it seems probable that, under certain conditions, the cells affected or disturbed in their functional activity may go on indefinitely secreting or excreting such bodies or extractives as we deem responsible for the production of auto-intoxications.

Sub-acute auto-intoxication is possibly one of the greatest predisposing conditions for the invasion of disease producing organisms. ns in the case of the ptomaine poisoning group, there are no recogAised anti-bodies or properties produced as a result of the auto-intoxication. It is an individual disease, and cannot be conveyed to other animals of the same group, although many individuals in a given place, presumably under similar conditions, may be affected at the same or succeeding time.

In the first two groups of Wells'* cases are of every day occurrence in Veterinary practice—in failure of elimination in diseases of the kidneys, more especially in dogs, and in diseases of the liver, to which possibly we do not give adequate recognition, as it is seldom one makes a postmortem examination of a town-worked and fed horse without appreciating the fact that the liver—of all the organs—exhibits pathological characters which have not been associated with any particular symptoms during life. I refer to Cirrhosis and Fatty Degeneration.

In the third group I think we can class what; to me, appears the more interesting expressions, I refer to Azoturia, or the so-called

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* "Chemical Pathology."

Hæmoglobinuria, and I would also add Lymphangitis of equines—both being confined to certain areas with constitutional symptoms—and to the common Town Fever of horses (which have been brought in from the country) as an illustration of a general auto-intoxication.

Azoturia (*Hæmoglobinuria*) is an equine disease, and is characterised by a great disturbance of nervous function, both local and central, which is accompanied in most cases by the presence of blood colouring matter in the urine. It is a disease of the plethoric group, and appears to be dependent upon exertion. In a sense it appears confined to females and geldings. I have never known a case in an entire, notwithstanding all the apparently predisposing elements which occur in the lives of the males of any of our breed groups. The age seems also to have some influence on the disease—it appears generally in early maturity and is more prevalent in the spring, which period is usually associated with a redundancy of vital force. One attack does not confer immunity, rather in the milder cases seems to create a susceptibility in that such cases frequently recur for quite a period of time.

In searching for the true pathology, our thoughts are divided into the two definite expressions, nervous and circulatory. As in all cases it is manifestly an interference in the action of some muscular group and is attended with constitutional disturbances, I think we may be justified in assuming the generation of some organic extractives within the muscular tissues, such bodies being speedily taken up by or conveyed to the nervous ganglia and even to the great nervous centre, for in many of the most acute and unfortunately fatal cases, convulsions and even delirium are present, in my experience, before the coming of the blood coloring matter in the urine. In more than one case of the acute form such an expression has been delayed for 24 or 36 hours, and has been attended by some relief of the toxic manifestation. I have known cases with all the local and general symptoms of this disease die in delirium within 24 hours without having passed any urine containing the broken up hæmatin.

Equine Lymphangitis (Weed) is a disease in which to my mind a local auto-intoxication seems an acceptable pathology. Again this is a plethoric disease with both local and constitutional disturbance. It definitely recurs, and in later life, owing to the great interference with mobility, passes from the plethoric to almost the opposite condition of the body. If we accept the theory of the power or probability of cells continuing to exert their altered function, it seems probable in this disease that the *materies morbi* is always present, and speedily shows its influence if conditions of bodily habit in food and circulation are suitable for its toxic influence.

It is the common and successful practice to treat these cases in such a way as to lessen the redundance of the system by with-holding stimulating food stuffs and giving exercise on every high day and holiday.

Town Fever seems a disease which is general and not local in its manifestation. The Pasteurella have the credit of being the operating causes, and may be so, but it seems curious that we can have a definite temperature of 106° F. at night and an absolute declension within 12 hours. The recurrence, which is such a known attribute, seems to suggest to me that this disease may be an auto-intoxication due to altered work, dietary and housing.

Milk Fever of bovines also appeals as a local intoxication, in which the toxin is so frail as to be split up by the presence or pressure of air. These organic compounds are, like the more definite toxins, amenable to the good influence of oxygen.

Rickets may possibly be a disease of a like cause operating in anæmic animals, as also those troublesome states of "ill doing" which we meet with, and which have such a similarity with pernicious anæmia in humans.

THERAPEUTICS.

In the absence of definite knowledge as to the chemical reaction of the bodies which give rise to auto-intoxication, it appears probable that the administration of alkaline salts, particularly of soda and potash, seems to be indicated.

Wells, discussing some experiments of acid intoxication in rabbits following repeated doses by the mouth of inorganic acids, brought about a condition in which the power of "internal respiration," as intercellular gas exchange is called, by preventing the removal of CO_2 from the cells, and in such cases there was little or no apparent cyanosis. The natural carrier of such CO^2 appears to be the carbonate of soda, which coming in contact with the CO_2 in the cells becomes converted into the bi-carbonate, and as such is carried to the lungs, where it yields up its extra carbonate and returns for further service. When the acids were introduced into the blood of the rabbit they formed neutral salts, which were eliminated by the kidneys, and did not set up any of those symptoms which were present when the acids were given by the mouth. Again, the alkaline group is much more likely to reach the tissues affected, and may combine with the metabolic products and form harmless compounds. Oxygenating influence also seems desirable, and where solutions cannot be injected, such medicaments as are easily split up and possibly yield oxygen in in the process, as the hyposulphite of soda, might with advantage be administered.

In chronic cases where these milder remedies fail, good results have been recorded of the use of mercury, iodine and arsenic: a favourite treatment of equine lymphangitis after the acute stage has passed, being a somewhat continued course of the mercuric potassium iodide.

In practice the desirability of the interchange of these more drastic medicaments should be considered, leaving a short period between the medication of these agents or their compounds. In all cases, acute or chronic, the efficient discharge of the duties of bowels, liver and kidneys is essential.

Constitutional disturbances will call for particular treatment as they arise in individual cases. In preventive medicine we may include all that is grouped in the study of hygiene, assisted by medicinal means as seem best suited to the occasion.

(References to Wells' Chemical Pathology).

[This paper was postponed owing to lack of time for reading.]

VOTES OF THANKS.

Prof. MACQUEEN: I have very great pleasure in proposing a vote of thanks to our President, Mr. Bowman, for the very excellent way in which he has performed the duties of President at this meeting. He has maintained the prestige of the Association, and I think he has certainly distinguished himself as our President.

Mr. GOOCH: I will second the motion.

The CHAIRMAN: I most thoroughly endorse what has been said. I have never been at a meeting which I have enjoyed better than this, and I know that our President has laid himself out to ensure the comfort of every member of this Association. We are very thankful to him.

The resolution was carried with acclamation.

Mr. J. F. SIMPSON: I have been asked to propose a vote of thanks to the Mayor and Corporation of this unique and beautiful town for the kindness which they have extended to us during our stay here. It is a compliment to a Society like ours for the Municipality, from its head to its lowest citizen, to come forward and recognise us as a profession worth recognition. It speaks well for those who are responsible in this town and in this great county and the neighbouring counties. As you know, individuals high and low, and bodies great and small, are apt to form their judgment of the whole from the individuals who reside amongst them, and I think it is very fortunate for our Society that we have residing in this district professional brethren who have proved themselves worthy of recognition, and through whom we have obtained the recognition that has been given to us (Hear, hear). The Municipal Authority have extended to us invitations to see the magnificent Baths and the Kursaal, and they honoured us by coming amongst us last night at our Banquet, and what they said of us you are all well acquainted with.

Mr. MALCOLM: I beg to second the motion, endorsing every word said by Mr. Simpson.

The motion was carried with acclamation.

Col. STEEL: I feel complimented in being asked to propose a vote of thanks to the writers of the papers. I can testify from personal observation that these papers have been of unusual interest, and I have attended the meetings year after year for many years. I will not particularise at all, but the proof of the assertion is this afternoon, because on previous occasions we have been hardly able to form a quorum so late in the meeting. But this afternoon we have had a crowded meeting and an animated discussion, and no greater compliment could be paid to the writers than the attention paid to their papers. We thank them most cordially.

Mr. SPREULL: I will second that motion.

The CHAIRMAN: I think we have never had a better lot of papers or had them better discussed. There has been no flagging of interest, and as Col. Steel says that is a proof of their excellent nature.

The motion was carried with acclamation.

Mr. CARTER: It gives me the greatest possible pleasure to propose that the very best thanks of this meeting be voted to those gentlemen who have so ably opened the discussions on the various papers we have had.

Mr. C. H. GOLLEDGE: I beg to second the motion.

The motion was carried unanimously.

Mr. LLOYD: The very pleasing task has been allotted to me of proposing a very hearty vote of thanks to the Provisional Committee. As you all know, the success of our meetings always depends on the Provisional Committee, and that Committee is made up usually of gentlemen who reside where the Annual Meeting takes place. This year it is in the great County of Yorkshire, and the meeting has been a very successful one, and I have no doubt that the greatest part of its success has been due in the first instance to the Yorkshire Veterinary Medical Society. The invitation came from those gentlemen, and two very active members of that Society have been running the show, Mr. Mason and Mr. Clarkson (Cheers). Mr. Mason has acted as the Chairman of the Provisional Committee, and everyone who knows his abilities knows that he is able to carry out duties of that sort well (Hear, hear). But there is always one gentleman who really has to do the work, and that is the Secretary of the Local Committee. He has to keep the Chairman primed, he has to keep the Treasurer primed, he has to keep the Members of the Committee primed, and he has to make them do what he tells them. Mr. Clarkson, who has acted as Local Secretary for the Provisional Committee in connection with this meeting, has been an undoubted success (Cheers).

The motion was duly seconded, and carried with acclamation.

The CHAIRMAN: The Provisional Committee has done wisely and well for us this year.

Mr. A. W. MASON: The eulogistic remarks which have fallen from the mover of this motion have given me and the members of our Committee the greatest pleasure. It has been our wish to make this meeting a success, and from what has been said evidently we have met with that success for which we hoped (Hear, hear). We have been only too delighted to think that the papers suggested by this Committee have met with your approbation and been successfully carried out. I stand here as the Chairman of the Provisional Committee, but I have been only the figurehead, as Mr. Clarkson has done the work. A more energetic, painstaking, conscientious Local Secretary you could not have had. I have had no trouble, no worry, and no anxiety. The whole of the success is due to Mr. Clarkson. In his absence I thank you for the kind sentiments you have expressed, and I will repeat them to him.

Mr. J. J. BELL: There are two gentlemen who take an active part in our Association whose duties are very light—there is nothing for them to do and therefore you cannot well give them a vote of thanks, but those who know Mr. Hunting know that he works night and day, and I am certain that Mr. Simpson is constantly at it. The money has to come in and he has to deal with it. It is with the greatest pleasure I propose a hearty vote of thanks to the officials of this Association. We have lost a very highly esteemed friend in Mr. Wragg, but fortunately we have another gentleman who has stepped in to fill the gap, and I hope these gentlemen will long be spared to occupy their positions.

Mr. SAMSON: I shall have very great pleasure in seconding that proposition.

The CHAIRMAN: Our worthy Secretary's labour is always that of love towards the Association and towards the members. I have never appealed to him but what help has been given. Our good friend Mr. Simpson we know all about. He is no new hand to us. We are delighted to have him, and we hope he will be able to continue the Treasurership of this Society for many years to come. Everybody has very great confidence in Mr. Simpson, and that is the very thing we want in our Treasurer. We have two men we could not possibly supersede, and I have the greatest pleasure in putting the resolution to you.

The resolution was carried with acclamation.

Mr. HUNTING: I thank you very much, and I hope I shall have many happy returns of the day.

Mr. SIMPSON: Thank you very much also. There is a certain amount of work connected with the Treasurership which is done quietly in one's home, and as a matter of fact you know how to make my work light.

The CHAIRMAN: That concludes the business of the day, and I am thankful to you for your presence and sustained interest this afternoon which has rendered my duties quite light. I will forward to the President all the kind things you have said about him this afternoon.

Mr. SPREULL: There is one resolution we must pass, a vote of thanks to our worthy Chairman. It would be a very improper thing to allow this meeting to separate without that.

Mr. MASON: I do not think it wants seconding, but I will put it for you, Mr. Chairman.

The resolution was carried with acclamation.

The CHAIRMAN: I do not wish to say anything about this, because you know how welcome you are to anything I can do (Cheers).

The meeting then terminated.

LIST OF MEMBERS OF THE NATIONAL VETERINARY ASSOCIATION, 1909-10.

Those marked (*) are Life Vice-Presidents.
,, ,, (1) have served as President.
,, ,, (2) ,, as Vice-President.
,, ,, (3) ,, on the Council.
,, ,, (4) ,, as Treasurer.
,, ,, (5) ,, as General Secretary.
,, ,, (6) ,, on Provisional Committee.
,, ,, (7) ,, as Local Secretary.
,, ,, (8) ,, written papers for discussion.
,, ,, (9) ,, opened discussions.
(F) signifies Fellow of the Royal Coll. Vet. Surgeons.

Abson, J., (F) (2, 3, 6, 7) 53 Norfolk St, Sheffield
Ackroyd, W., Halifax
Aitken, John, Junr., Dalkeith
Allen, Chas. (F) (* 1, 2) Dublin
Almond, N., (F) (8) Cambridge House, Kingston-on-Thames
Anderton, F. W., 59 Manning Lane, Bradford
Archer, A. H., 1 Stafford Rd, Southsea
Ascott, Wm. (6) Bideford
Auger. A. S., (6, 9) Saxmundham
Auger, T. E., (6) Wymondham, Norfolk
Awde, W., (F) (2,3,6) Stockton-on-Tees
Baird, A., York Lane. Edinburgh
Baker, E. W., (2) Wimborne, Dorset
Banham, Geo. A., (F) (2, 3, 5, 6, 7, 8). Cambridge
Barber, G. C., East Street, Leeds
Barcham, T. E., North Walsham
Barling, F. W., (3, 6) New House, Ross, Herefordshire
Barron, R., Blandford
Batt, T., (6) 469 Oxford St, London
Bayley, A. E., 144 Lordship Road, N.
Beart, W. J., King's Lynn, Norfolk
Beckett, A. J., (6) Riverside, Sandymount, Dublin
Beddard, E., (F) (2, 3) Cleveland Road, Wolverhampton
Bell, G. J., 2 High Street, Wandsworth
Bell, John J., (2, 3, 6) Carlisle
Blake, A., Nailsworth, Glos.
Blakeway, Jno., (F) (6, 7) Chaddesley Corbet, nr. Kidderminster
Blench, J., Birdgate, Pickering
Bloxsome, Gerald W., (6) 15 Davigdor Road, Hove
Bloye, W. H., (F) (* 1, 2, 3) Ebrington Street, Plymouth
Bond, P. G., (6, 7) Plymouth
Borthwick, Jas., Gateside, Kirkliston
Bowden, A. Cornish, 127 High Street, Beckenham
Bower, Wm., (* 1) East Rudham, Norfolk
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Bowman, G. E., (1, 6) Woodhouse Lane, Leeds
Bradley, O. C., (7, 8) Veterinary Coll., Edinburgh
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Brooks, H., Leadenham Lincoln
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Cameron, J., Bridge Street, Berwick
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Carless, W. S., (2, 3) Worcester
Carr, F. U., Capt. A.V.C., Aldershot
Carter, G. W., (6) Keighley
Carter, J. H., (F) (2, 3, 6) Burnley
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Clifford, C. J., Mount Hamilton, Dundalk, Ireland
Clough, F. W. S., (6) Morley, nr. Leeds
Cockburn, R., (6) Eastwood, Notts.
Coe, J. W., (F) (3,6,7) Stoke-on-Trent, Staffs.
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Connochie, T. D., Galashiels
Constable, D., (3, 6) Inchture, Perthshire
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Crowhurst, E. G., (F) (3) Hindley House, Leamington
Cunningham, C., (2, 3) Slateford, Midlothian
Cureton, W., The Chance, Upton, Birkenhead
Daly, J. V., (3) Bo-Peep Island Bridge, Dublin
Darwell, A. H., (3, 6) Northwich, Cheshire
Davies, D. G., (2, 3) Swansea
Dawes, H. J., (F) West Bromwich
Dawson, W., (6) Cavan
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Dollar, T. A. } St, London
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Duck, F. (F) C. B., Col. A.V.D. Kilindini, Cranes Park, Surbiton
Duckworth, T. H. L., Ashbourne, Derbyshire
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Elder, G. H., Taunton
Elder, W. A., Matthews Green, Wokingham
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Foreman, W. J., Leadgate, Co. Durham
Forsyth, A. B., Cannock
Freeman, R. B. (2, 6) Harry St, Dublin
Freer, B. (6) Uppingham, Rutland
Garnett, F. W., J.P., (* 1, 3, 9) Windermere
Gibbings, G. H. (F) (3, 6) Tavistock,
Gofton, Prof. A., R.V.Coll., Edinburgh
Golledge, C. H., Sherborne, Dorset

Gooch, F. L. (F) (2, 3, 6) St. Martin's, Stamford
Gooch, J. K., Holt, S.O, Norfolk
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Harding, E. R., Salisbury
Hartley, Chas. (F) (2, 3, 6) Lincoln
Haywood, Chas., Millstone Lane, Leicester
Healy, J. F. (2, 6) Midleton, Co. Cork
Heatley, T. G., (6) Woodbridge
Hedley, M. (F) (* 1, 2, 3, 7) 6 Royal Terrace, Kingstown, Dublin
Heelis, L. W., Solihull
Hepburn, W., Coldstream
Hewson, Frederick (6) Royston, Herts
Hickes, J. R., (6) Market Weighton
Hill, J. Campbell, Town Hall, Llanelly
Hoare, E. W., (F) (2,6,8) 18 Cook St, Cork
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Holland, J. (6) Athy, Co. Kildare
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Howard, P. J. (2, 3, 8) Ennis, Co. Clare
Howard, P. S. (F) "Windermere," Cambridge Park, Wanstead, Essex
Howe, G., (3, 6) Buxton
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Hughes, R. (F) (2, 3, 6) Willow Street, Oswestry
Hunter, H. (2, 3, 6, 9) New Bridge Street, Newcastle-on-Tyne
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James, J. C. (F) Thornbury, Glo'ster
James, W. H., Frome
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Jones, J. T. Share, Liverpool University
Jones, R., Towyn, Merionethshire
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Jurgenson, W. M. (6) Ipswich
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Lambert, T. D. (F) (2, 3, 6) 47 South Richmond Street, Dublin
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Martin, Major E. E., A.V.C., (8), Club of Western India, Poona
Martin, J. B. (2, 3, 6) Rochester
Mason, A. W. (F) (* 1, 6) North Street, Leeds
Mason, F. C., (6) Newtown Park, Co. Dublin
Matthews, Geoffrey, Man of Ross House, Ross
Mellett, E. J., Hart Street, Henley-on-Thames
Meredith, J. A. (F) Major A.V.C., Vron Vyrnwy, Llanfechan, Llanymynech, Montgomeryshire
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Nelder, W. B. (F) Exeter
Newsom, G. (3,6) Ashford, Co. Wicklow
Nisbet, J. B. (F) Fence Houses, Durham
Nixon, H., Sheffield
Nolans, J. W. (3) Cumberland Street, Birr, Ireland
Norris, J. H., (6) Shannon Lawn, Glin, Co. Limerick
Norwood, W. W., (6) Connisbro', Yorks
O'Connor, J. J. Prof. Royal Vet. Coll. Dublin
Olver, T. (3) Trafalgar Square, Truro
Over, Alf, (2, 3, 6) Rugby
Owen, E. P. (3, 6, 7) Thame, Oxford
Oxenham, A. W., Glyn Gwyn Farm, Mountain Ash
Pack, C. (2) Lymington, Hants
Packman, W. (3, 6) Bury, Lancashire
Pallin, Capt. W. A.. A.V.C., Curragh, Co. Kildare
Parker, J. H., Faringdon
Parker, J. M. (* 1, 3, 6) 9½ Moore Street, Birmingham
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Patrick, W. Cargill, (F) (3,6) Mullingar
Pauer, W., Blackwater, Hants
Pawlett, F. W., (6) Bootham, York
Peddie, James (9) Dundee
Penberthy, J. (F) (2, 3, 5, 6, 7, 8, 9) Dean Hall, Newnham, SO., Glos.
Perry, J., Cardiff
Pethick, R. S., Tiverton
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Pillers, A. W. Noel, Sheffield
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Pratt, E. H., (6) Northallerton
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Prentice, D. S., Dept. of Agric. Dublin
Preston, J. (F) (2,6) Mallow, Co. Cork
Price, E. (2) Birmingham
Price, T. S. (2, 3) 30 Brixton Hill, London, S.W.
Pugh, D. (F) (3, 6) Sevenoaks, Kent
Rea, C. (6) Clonmel, Co. Tipperary
Reeman, W. M. (6) Bury St. Edmunds
Rees, J. F., Lammas Street, Carmarthen
Rees. W. D., Bryn Bedw, Tylorstown, Pontygwaith, S.O., Glam.
Reilly, Col. (6) Adare, Co. Limerick
Renfrew, Arch, Broadwater, Worcester
Reynolds, H. S., Daventry
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Roberts, H. Keeling, The Govt. Offices, Blœmfontein, O.R.C. S. Africa

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Roberts, R. (F) (* 1, 2, 3, 6, 8) Tunbridge Wells
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Robinson, M. (6) Barnsley
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Rudkin, T. A. (2, 6) Grantham
Runciman, T. (2, 6) Ely, Cambs.
Russell, E. C., Lieut. A.V.C. Saharanpur, India
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Ryan, E. A., Strokestown, Co. Roscommon
Sampson, S. E., (6) Hillsboro', Sheffield
Samson, F. G. (3, 6) Upper Green, Mitcham, Surrey
Savage, W., Bangor
Schofield. W. G., (6) Pontefract
Scott, R., Ambleside
Scott, W. M., Binford Place, Bridgwater
Shave, E. S. (F) (6) R.V.C., Camden Town, London
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Shipley, W. (F) (* 1, 2, 3, 7) Southtown, Gt. Yarmouth
Simpson, J. F., J.P., (F) (* 1, 2, 3, 4, 6) Maidenhead, Berks
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Smith, A., Major, Punjab Vety. Coll. Lahore, India
Smith, Fred. (F) C.B. (2,8,9) Maj. Gen. A.V.S., Glenluce Rd, Blackheath
Smith, G., Tunstall
Smith, Sidney, (6) High St., Lowestoft
Somers, F. W., (6, 7) 4 Wade Lane, Leeds
Spencer, Trevor, (3, 6) Kettering
Spicer, A., Crabwood, New Oxted
Spreull, A., (6) Dundee
Stainton, W. A., (F) (6) St. Vincent Lodge, Silverdale Rd., Eastbourne
Steel, Chas., (F) (2, 3) Lieut -Col.A.V.D. United Service Club, Dublin
Stent, E. H., Hulme, Manchester
Stephenson, C., (F) (6, 9)
Sandyford Villa, Newcastle-on-Tyne
Stewart, A. C., Neville Street, Cardiff
Stewart, J. M., Swansea
Stockman, S., (2, 3, 8, 9) Board of Agriculture
Storrar, D. M., (F) (6) Abergavenny
Stroud, E. L., (F) (6) 29 Spring Street. Hyde Park, W.
Sumner, H., (6, 8) Chapel Court, 15 Vauxhall Road, Liverpool
Tagg, J., Constitutional Club, Northumberland Avenue, W.
Tailby, M. (3, 6) Dalton St, Birmingham
Tayler, R. C., (6) Colchester
Taylor, F. J., (6) Moseley, Birmingham
Taylor, W. A., (F) (3, 6) Turner St., Manchester
Temple, J., Aberaman, Aberdare
Tennant, R. C., (6) Thames Street, Windsor
Thackeray, H., 15 Tipping Street, Stafford
Thompson, Hy., (3, 6, 9) Aspatria, Cumberland
Thompson, J. A., (F) (3) Lurgan
Thompson, Jas., 63 Fountainhall Road, Aberdeen
Thomson, H., C.B., Maj.-Gen., A.V.S., Essilmont House, Bedford
Thomson, J., (6) Coventry
Tipper, L. C., Balsall Heath, Birmingham
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Todd, J. Alex., (2, 3, 6) Chapel Road, Worthing
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Tucker, F. J., "Geltsdale," Monnero Street, Monmouth
Tyson, G. W., Kilshane House, Finglas, Co. Dublin
Verney, R. J., (6) Oxford
Villar, Sidney, (F) (3, 6, 7, 8, 9) Amersham Common, Bucks
Wartnaby, Geo., (3, 6) Burton-on-Trent
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Wharam, Samuel, (2, 6) Leeds
Wheatley, Albert, (F) (2, 3, 6)
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Whitehead, G., (6) Batley
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Williams, W.O., (1,2,3,6,9) Vet. School, The University, Liverpool
Williams, W. R., Bridgend, Glam.
Wilson, Ainsworth, (6) Witham
Wilson, P., Glenmore, Lanark
Wilson, Wm., (F) (3) Berkhampstead
Winter, E. C., (F) (3, 6) Queen Street, Limerick
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Woods, W., (F) (2, 3, 6) Wigan
Wooldridge, G. H., (8) R. V. College, Camden Town, London, N.W.
Wyllie, D., Tudor House, Staines
Wynne, J. H., Denbigh, North Wales
Young, W. Jackson, 7 Newington Rd Brocco Bank, Sheffield

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Dr. B. Bang, Copenhagen,
Rubert Boyce, F.R.S., Liverpool,
J. A. Murray, M.D.

Total number of Members, 365.

If any errors occur in the above list, please communicate with the General Secretary, W. Hunting, 5 Halkin Place, Belgrave Square, S.W.